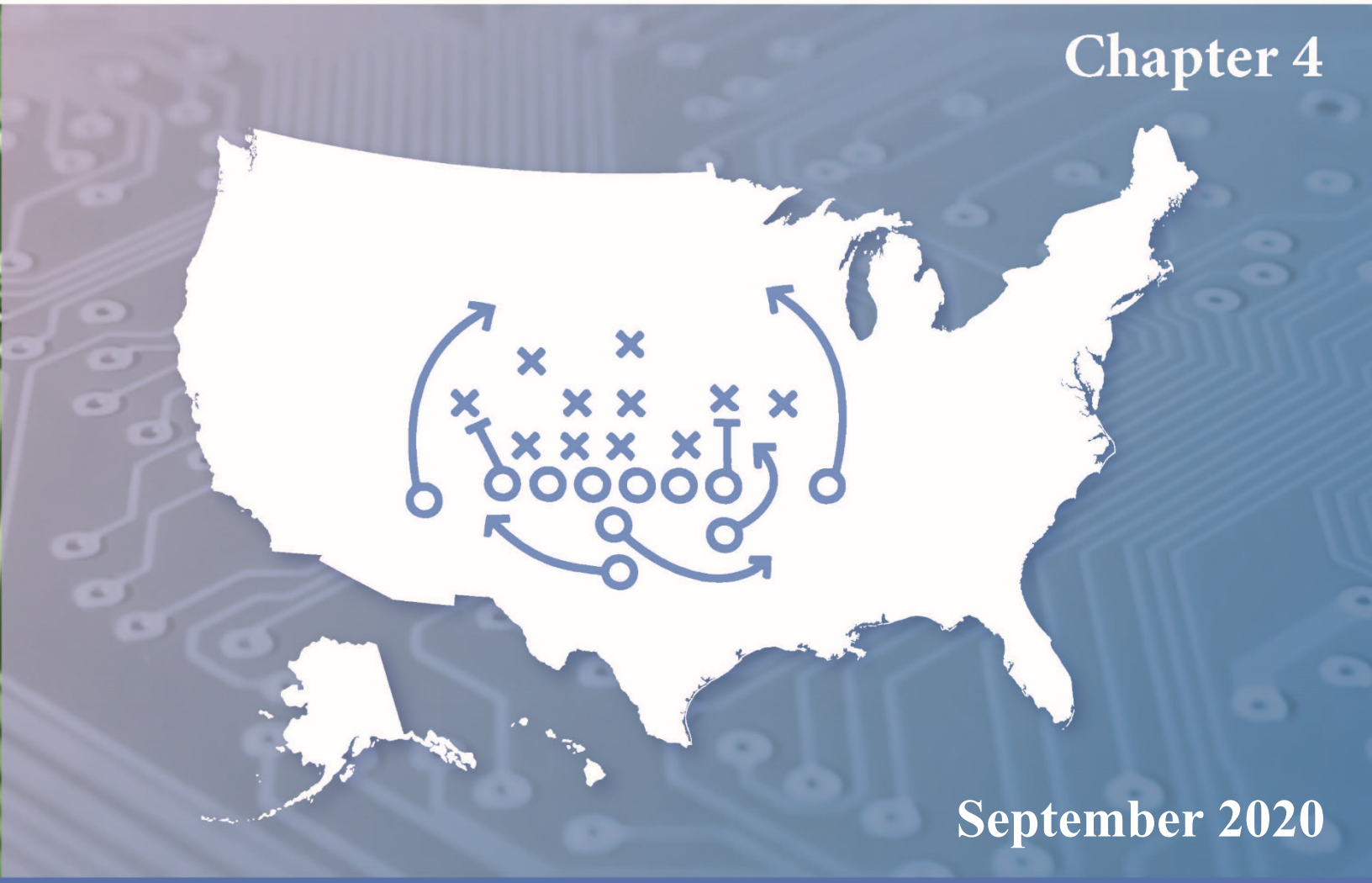
The National 911 Program

# NEXT GENERATION 911 INTERSTATE PLAYBOOK



Chapter 4

September 2020

## Implementing State-to-State 911 Connectivity: Lessons Learned, Challenges, and Opportunities

*ESInet Testing Guide, State Cost Challenges, Forest Guide 101, Integrating Military Installations into State and Local Solutions, Statute Review for NG911 Readiness*

911.gov

# CHAPTER 4

# NEXT GENERATION 911 INTERSTATE PLAYBOOK

The **Next Generation 911 Interstate Playbook, Chapter 4** takes a deeper dive into the transition of Next Generation 911 (NG911) services in four mid-central states: Iowa, Minnesota, North Dakota, and South Dakota. Each state—at a different stage of implementation and transition—is approaching NG911 in a way that meets its needs.

## LESSONS LEARNED

In Chapter 4 you will find lessons on transitioning and retiring legacy network elements such as selective routers; methods and tools for reviewing your current statute and rules to determine their readiness for NG911; steps to follow for integrating and interoperating with federal military installations in your communities; why the Forest Guide is so important and how to prepare for it; and what was learned when testing between two different Emergency Services Internet Protocol (IP) network (ESInet) providers between states to transfer calls between border public safety answering points (PSAPs) in Iowa and Minnesota; and more.

## HOW DOES CHAPTER 4 OF THE INTERSTATE PLAYBOOK HELP YOUR STATE OR REGION?

The lessons and experiences discussed in Chapter 4 provide guidance and replicable experiences, and best practices for your consideration as well as key focus areas to aid in the progress in your state. By understanding what to observe, request, watch out for and expect, these experiences and lessons can assist your state in preparing a smoother path to advancing NG911.

## NEXT STEPS IN NG911 INTERCONNECTION IN YOUR STATE OR REGION?

Follow the experiences of participating Interstate Playbook states to gain a broader and more in-depth appreciation of the challenges of NG911 implementation as well how states experiencing those transitional challenges have addressed the issues and overcome the challenges. By learning from their experiences, we hope to help you smooth your transition to enjoy the benefits of NG911 in your communities.

## WANT TO LEARN MORE?

Chapter 4 of the Interstate Playbook would not have been possible without the continued assistance of state 911 coordinators and 911 leadership from Iowa, Minnesota, North Dakota, and South Dakota, and their support partners.

For more information on the Interstate Playbook, including Chapters 1, 2, and 3, visit www.911.gov, or contact the National 911 Program at nhtsa.national911@dot.gov.

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# 1. Background

The 911 directors from the states of Iowa, Minnesota, North Dakota, and South Dakota have been meeting jointly for the past four years to discuss and work through the process of migrating to Next Generation 911 (NG911) services from the legacy 911 environments and networks that have been used since 911 was implemented in their state. Of course, there have been modifications to accommodate new services, such as wireless or voice over Internet Protocol (VoIP), over the years but the transition to NG911 is the most significant change to network infrastructure that 911 authorities have ever addressed.

The purpose of Chapter 4 of the Interstate Playbook is to observe and document the activities and experiences of these four typical states and to capture the lessons learned to inform and educate other states or local 911 authorities on the processes and challenges they might encounter as they proceed toward full implementation of NG911. Each state is at a different stage of transition, probably much like your community or state.

There is much to learn, and be aware of, regarding the transition to NG911, and Chapter 4 contains new information to assist—documented test activities and results; challenges; descriptions of how those challenges were addressed; and resources including samples, templates, examples, and even tools and ideas to make the transition easier from the experiences of those who have done this already.

To highlight a few of the sections in Chapter 4:

- A section on the state implementation **status of the transition maturity level** of each participant state based on data collected by the National Association of State 911 Administrators (NASNA) and published by the National 911 Program in its *National 911 Progress* Report
- Emergency Services Internet Protocol (IP) network (ESInet) **testing in a lab environment between disparate service providers** and what the vendors of these disparate systems have learned that will translate to easier transitions going forward
- How to conduct a **review of current statute** and rules to better prepare your state or region for NG911
- A discussion of the **cost challenges** that states and local 911 authorities face as deregulation of communication services challenges the ability to plan and budget for transitional services
- What is involved **in transitioning from legacy 911 selective routers** to NG911 service and what to expect during the process
- What **methods of procedure (MOP)** are significant and how a structure to follow can ease your transition

- What you need to know about the national **Forest Guide (FG)** and how it impacts your NG911 implementation
- More on geographic information systems (GIS) and specifically how **neighboring state GIS edge matching** needs to take place for improved response
- The importance of talking to the **Department of Defense (DOD) military installations** in your state, region, or county to accommodate integration of NG911 service to the federal partner emergency communications services in your community

This chapter contains detailed discussion of the issues and challenges confronted by the participant states, and the best practices, key focus points, and additional references that will help determine the right migration and implementation path for you.

The National 911 Program gratefully acknowledges the contributions of many individuals whose participation in this project and dedicated resources made this Chapter of the Playbook possible.

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# 2. Migrating From The Legacy Selective Router To NG911

## 2.1. Overview/Background

The NG911 environment is significantly different from the current legacy 911 environment. These differences are not limited to standards and technology but include adjustments to governance, management and operation of the system(s), and the delivery of both traditional 911 services along with other new emergency services. The changes affect the entire 911 community—including the general public and other associated emergency services. The planning and migration to an NG911 system is, as many states are realizing, an extensive, multi-year effort.

911 authorities must first consider the preferred deployment approach for their transition. The United States (U.S.) Department of Transportation's (USDOT) *Next Generation 9-1-1 (NG9-1-1) System Initiative Transition Plan*[1] describes two general frameworks of deployment.

- *Coordinated/Intergovernmental Approach*: Planned and coordinated deployments of NG911 capabilities that are governed by statewide 911 authorities, regional authorities, or informal mechanisms that enable a cooperative deployment.
- *Independent, Unilateral Approach*: Decentralized deployments of NG911 capabilities by local jurisdictions through independent initiatives.

The planning authority should begin with a needs assessment/feasibility study to determine the operational requirements to form an overall picture of system requirements and baseline functionality necessary for any proposed NG911 solution. NG911 systems architecture will be designed based on these systems requirements. A transition plan should be developed to ensure the successful transition from the current 911 system to the new NG911 system for optimal success.

## 2.2. State Migration

Many states are in the process of planning their selective router migration to NG911, using different plans to accomplish it. NASNA recently conducted a survey of states to assess the progress and timeline that states were undergoing as a part of determining national status and implementation. The following chart illustrates the nationwide aggregated estimate schedule of selective router transition; three states indicated their migration is complete.

[1] "Next Generation 9-1-1 (NG9-1-1) System Initiative Transition Plan." Version 1.0, U.S. Department of Transportation, February 2, 2009. https://www.911.gov/pdf/USDOT_NG911_Transition_Plan.pdf

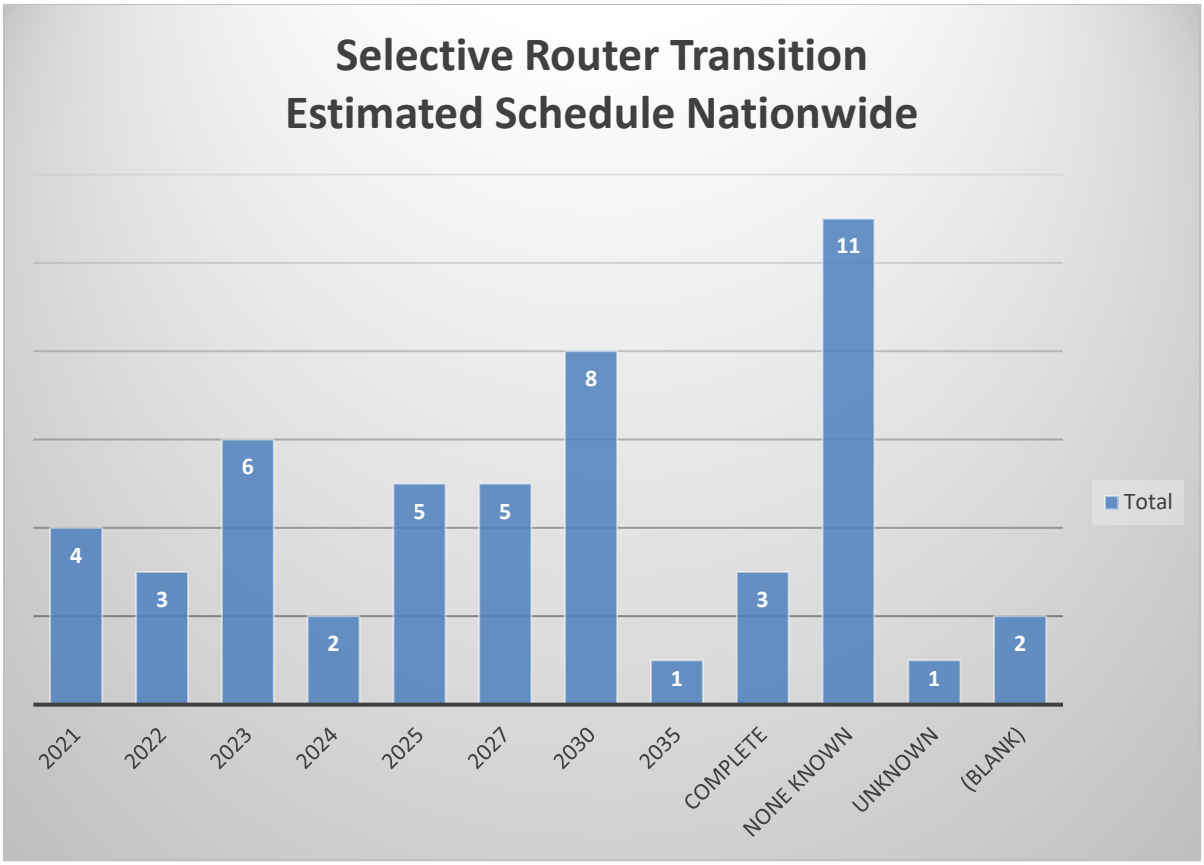



**Figure 1: Selective Router Transition Estimate**

Appendix A includes an estimated schedule of transition of the legacy selective routers by state, which was provided by NASNA. The columns represent the number of states that estimate they will transition from legacy networks to NG911 service in the year indicated.

## 2.3. Issue Identification

Even with the best plans, modifications may need to be made along the way and that is what both Iowa and Minnesota have experienced. As states and agencies learn more, as standards are refined, as vendors and providers change their applications or technology, and as legacy providers modify their own technology migration to IP services, the issues change and morph and the challenges and opportunities take on a different perspective. In this section, we discuss the experiences of Iowa and Minnesota as they navigate two different approaches to migrating from the legacy selective router to NG911 ESInet and Next Generation Core Services (NGCS) provision in their states.

To establish a point of reference, the three figures that follow illustrate a high-level NG911 network configuration and migration in three stages.

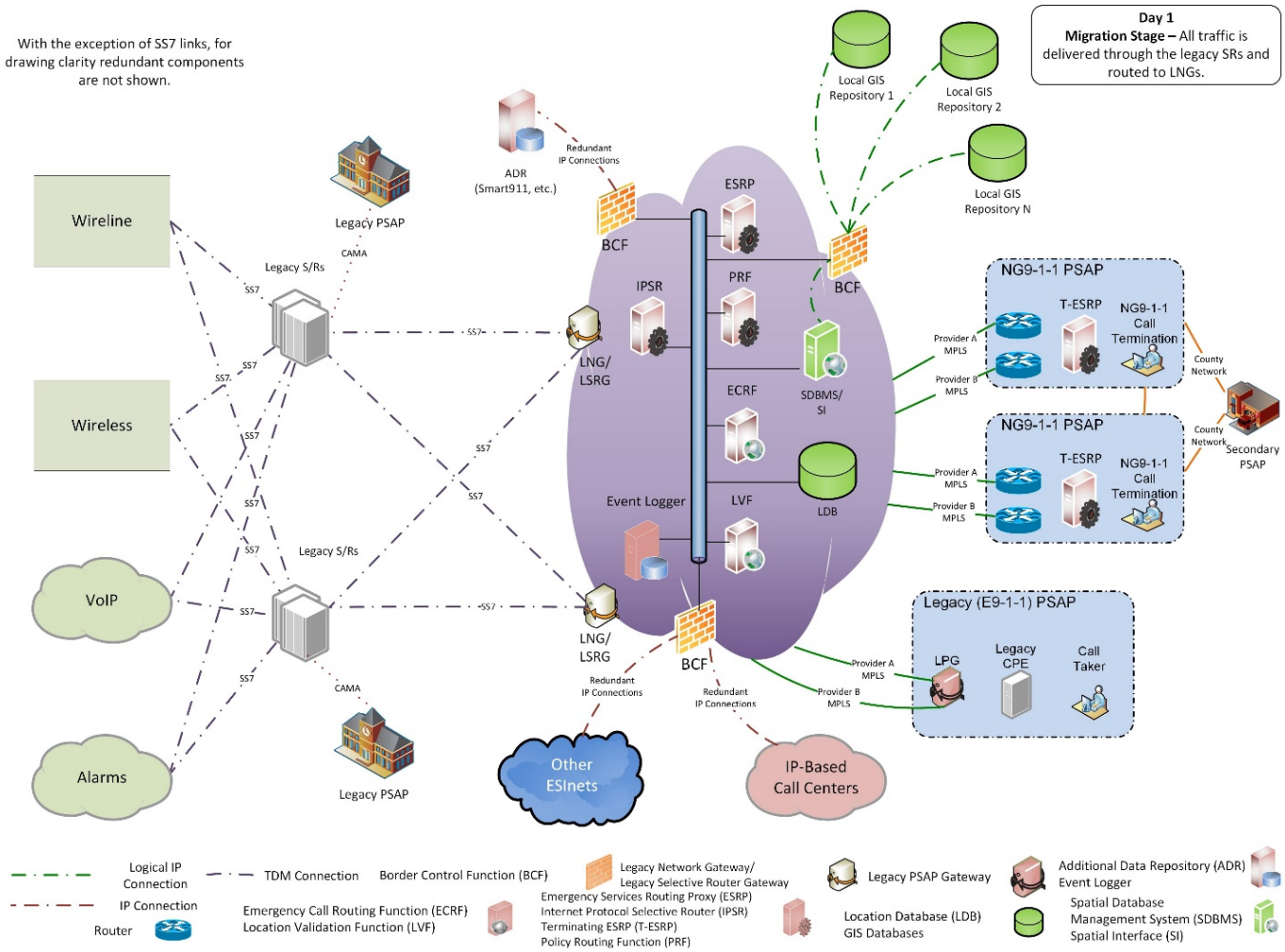



**Figure 2: NG911 Generic Phase 1 Selective Router Diagram**

The illustration above depicts Phase 1 of the migration process from the legacy selective router, where all 911 traffic is delivered through the legacy selective router and is routed to legacy network gateways (LNGs).

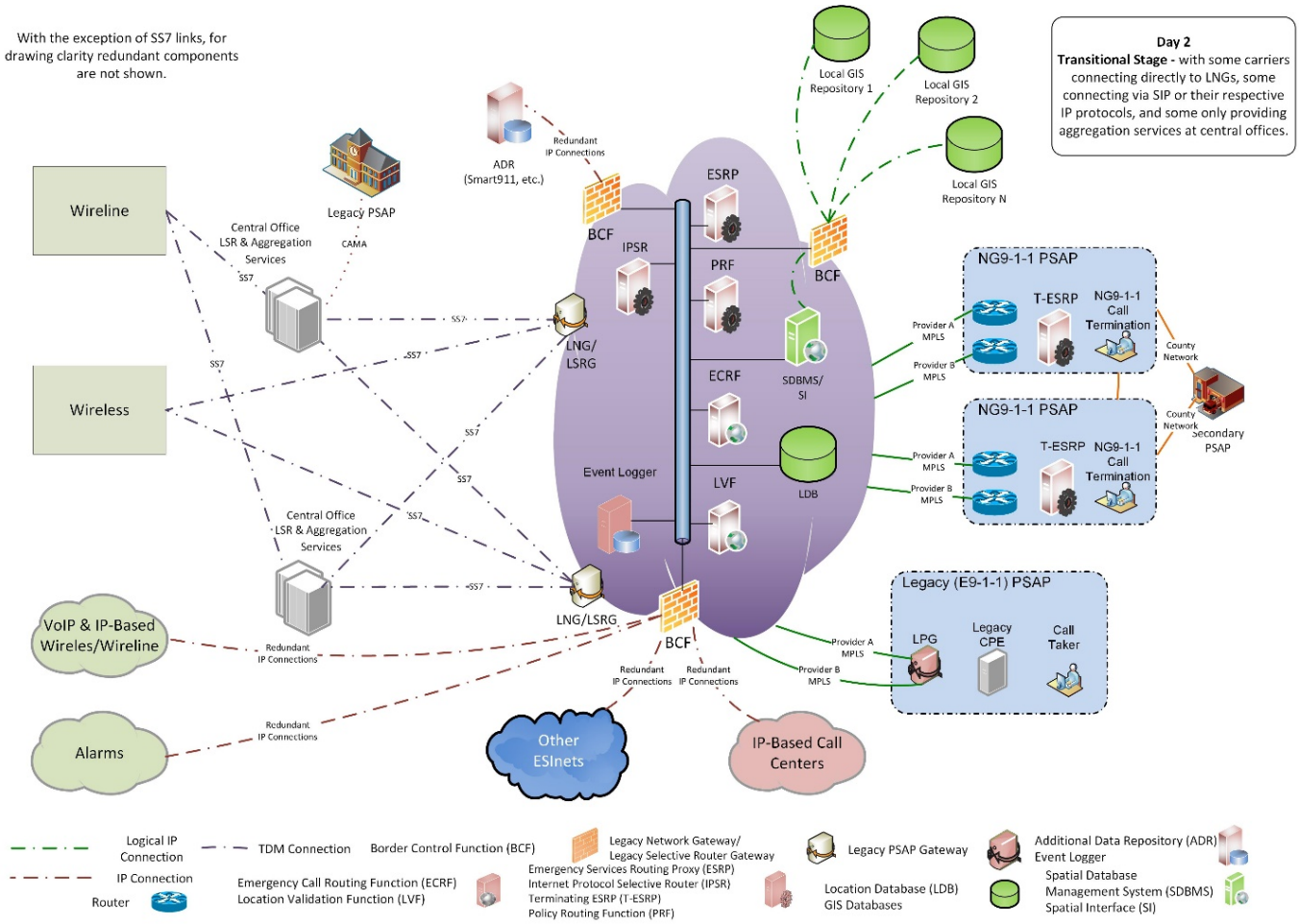



**Figure 3: NG911 Generic Phase 2 Selective Router Migration Diagram**

In the second phase of selective router transition, which is also referred to as the Transitional Stage, some carriers are connected directly to LNGs, some are connected via Session Initiation Protocol (SIP) or their respective IPs, and some might only provide aggregation services at the central office.

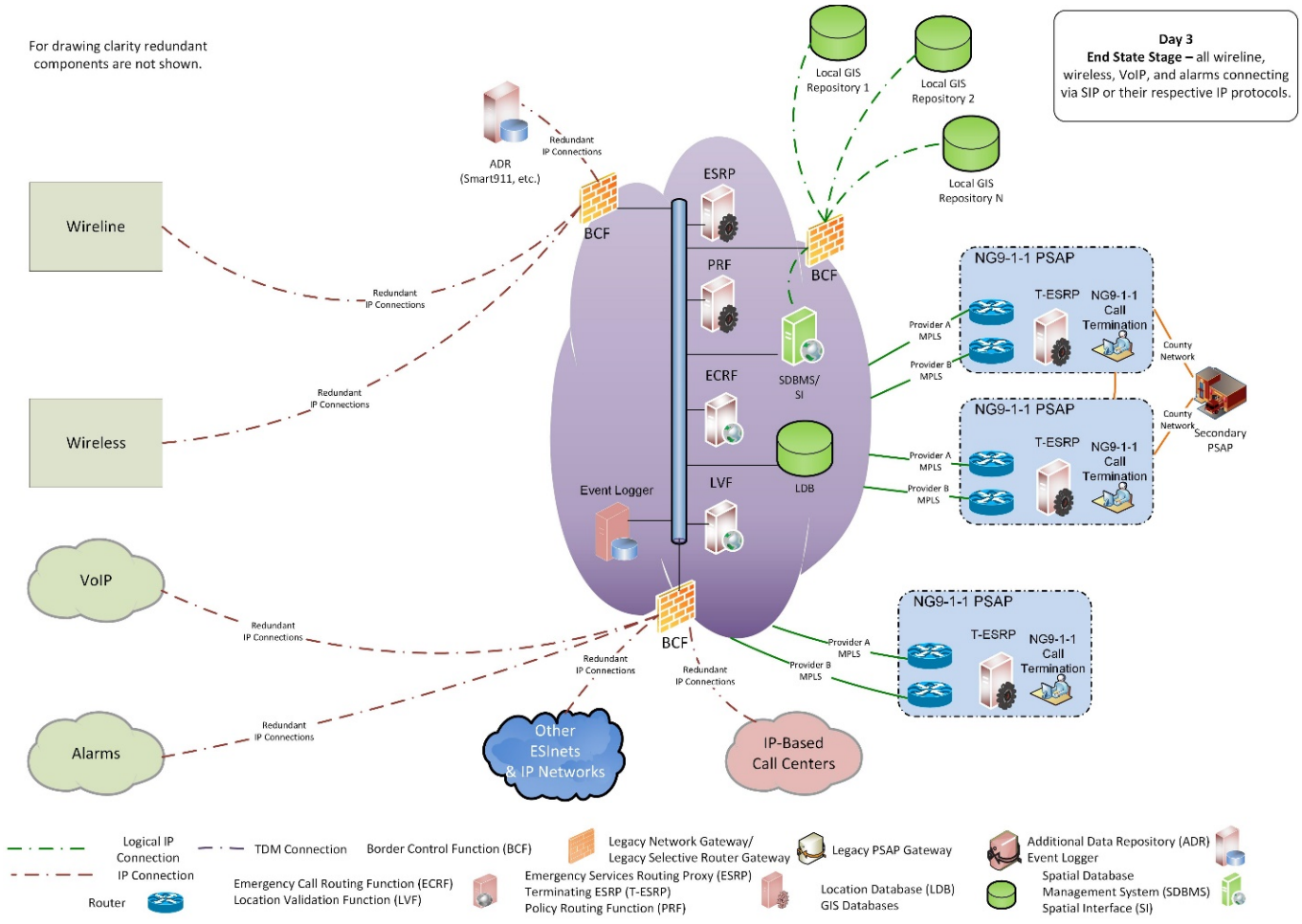



**Figure 4: NG911 Generic Phase 3 Selective Router Migration Diagram**

The third phase of selective router transition, the End State Stage, is marked by all wireline, wireless, VoIP, and alarms connecting via SIP or their respective IPs.

## 2.4. Iowa's Experience

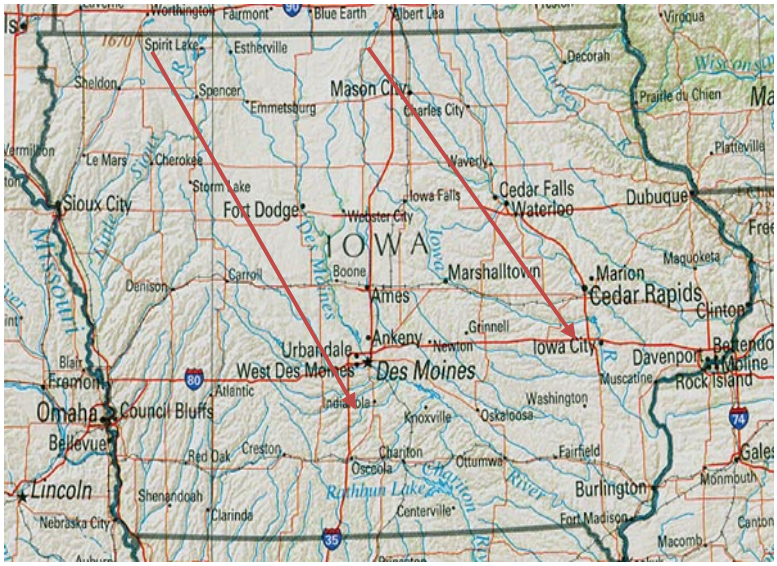
Challenges present themselves during any technology transition. In the case of the NG911 transition observed in our participant states, Iowa experienced a challenge that has caused delays in transition and unexpected expense. The Iowa 911 Program and local 911 jurisdictions shared responsibility for 911 in the state for many years.

Until recent legislative changes, wireline service was a local responsibility with fee collection and network contracts/agreements held directly with legacy 911 service providers under the control and authority of the local 911 jurisdiction. When wireless service began in Iowa more than 15 years ago, and because wireless service did not follow existing central office or wireline network boundaries, the

service areas overlapped local 911 jurisdictional boundaries; hence, the state was established as the authority and control for wireless 911 service. The state receives the wireless 911 fees and was assigned responsibility for the wireless 911 network and routing. This state-centric management of wireless 911 permitted a much faster means to implement wireless 911 in Iowa than other fragmented approaches.

In 2018 the wireless portion of the 911 system had undergone a significant upgrade to an IP-based system. The first phase of a multiphase NG911 transitional effort converted analog/copper trunking to local public safety answering points (PSAPs) to a statewide, IP-based Ethernet network. The IP-based backbone uses the Iowa Communications Network (ICN). The second phase of the network upgrade was completed in 2019. This phase of NG911 migration updated individual PSAPs to IP-enabled call-handling equipment (CHE) and logging recorders to make the state's PSAPs IP-enabled end-to-end. In January 2019, work also began on the state's virtual network merger efforts, technologically merging the legacy wireline network with the next generation IP-based wireless network, as well as sharing technology for call processing equipment at the PSAPs.

Iowa continued to maintain separate wireline and wireless 911 networks that did not interface with each other until this last phase of its network merger, which began in 2019 and continues into 2020. Changes in state law in 2018 directed the Department of Homeland Security and Emergency Management (HSEMD), under which the state 911 office is housed, to implement a plan to combine the wireline 911 network with the NG911 network. HSEMD is currently working with the ICN and the NGCS provider to implement changes to deliver wireline 911 calls over the Iowa ESInet. Along with a shared-services environment, the wireline migration onto the next generation network began in early 2019 and was to be completed within the first six months of 2020. Then two things changed the trajectory of the Iowa plan. The COVID-19 pandemic presented itself along with its own set of challenges. While migration continued, its progress was slowed and resources were distracted due to immediate need to address the critical nature of the pandemic. The second challenge was an announcement by the legacy service provider to no longer provide automatic location identification (ALI) services once the centralized automatic message accounting (CAMA) network was transitioned to IP.

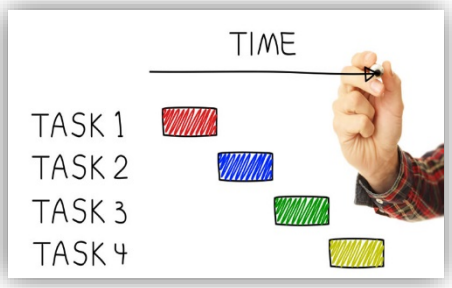



As part of the HSEMD migration strategy to deliver wireline 911 calls over the ESInet, ICN and the NGCS provider required changes to the way ALI and ANI (automatic number identification) are used by the new system.

The plan was for wireline traffic to be routed from the legacy 911 provider selective routers to ICN aggregation points located in Des Moines and Cedar Rapids. The ICN will transport the traffic from those aggregation points (via disparate and redundant paths from the ESInet) to the NGCS provider's Call Logic Center (CLC), essentially the call routing equipment location. At that point, wireline 911 traffic will be delivered to the PSAPs similarly to wireless 911 calls. Wireline 911 traffic will then share the benefits of NG911, such as automatic call reroutes in the event of outages or maintenance, as wireless 911 has for years. As with wireless 911, wireline 911 will be able to be transferred to any PSAP across the state and across the border to neighboring states such as Minnesota.

That was the plan being executed for Iowa. However, as noted earlier, during the process the legacy service provider announced to the state authority that, when the migration is complete, the legacy service provider will no longer provide ALI, even though Iowa had intended to continue to contract with the legacy provider to provide ALI. This late and unanticipated notice and change in service required the state authority to plan an associated migration of ALI to the wireless network that it was hoping to avoid by using existing services. The modification by the legacy provider has delayed migration by at least a year, not to mention the additional costs involved in these resource-intense changes.

Iowa is currently undertaking a statewide ALI transition and, in the process, has chosen to scrub[2] the data to help ensure accuracy for its associated GIS project. This need to reassess and redirect how Iowa was going to transition was an unforeseen complication that has challenged the migration schedule and increased resource consumption in Iowa.




It is not mandatory to scrub ALI data before migrating to the NGCS solution. A copy of the ALI database or ALI extract can be requested from the legacy service provider(s) for upload to the NGCS provider's ALI/LIS (location information server) solution. The scrub can take place later as the GIS

[2] Error correction and validation activity to ensure data accuracy.

data will need to be compared to the legacy Master Street Address Guide (MSAG) against road centerline data and ALI address points to site structure address points in GIS. Once there is an agreed upon, acceptable match rate, GIS data should be able to be the single set of data to manage.

In Iowa, two situations impacted the state's decision. One was that the GIS conversion was occurring at the same time and the other was related to the annual ALI extract timing. In Iowa, and in other states as well, a single ALI extract can be requested annually at no charge and, in some situations, this is on an automatic delivery rotation. Additional ALI extract requests incur cost but might be necessary. Iowa PSAPs were on a rotation schedule with the legacy service provider and its contractor and some PSAPs had already received their ALI extract for the year. An ALI extract was used for the Iowa statewide alerting project and the statewide GIS project, both in progress simultaneously with the NG911 transition project. As part of the NG911 transition, Iowa did request a second ALI extract and understood that additional costs would be incurred. After some negotiation, a second statewide ALI extract was provided to the NGCS provider free of any additional charges.

There are approximately 20 PSAPs in the state that have local ALI databases. Each independent ALI must be transitioned as well. The resources required to accomplish this in smaller PSAPs also challenge the timeline as the additional work has to be managed and staged to accommodate the needs of the PSAP.

Because the local jurisdiction was contracted with the legacy service provider for wireline service and not the state, a letter of agency (LOA) for each serving wireline provider was necessary to allow the state to manage the project and to give the state the authority it needed to request data. Copies of a typical LOA are included in Appendix B.

PSAP migration to the merged network was expected to begin in the spring of 2020 and be completed by fall of 2020. However, as noted above, several unanticipated situations impacted the original schedule, including the COVID-19 pandemic and business decisions by the 911 service provider outside of the State's control, extending the transition process until the end of 2020.

### 2.4.1. State Challenges

| | |
|---|---|
| Challenge #1: Costs | •Ability to substantiate, validate and determine reasonableness of costs.<br>•No reliable way to determine actual costs of that transport back to PSAP.<br>•The tariff rates are not consistent and there is little correlation or explanation for what the charges are based on.<br>•Deregulated wireline service makes it difficult, if not impossible, to validate against reasonable parameters. |
| Challenge #2: Authority to establish POI | •The determination of who has the authority to determine the point of interconnection (POI) is unclear and service providers have challenged the state's right to design the most appropriate network for their needs, thus adding unnecessary cost and implementation delays. |
| Challenge #3: Unanticipated changes impact resources and timelines | •Withdrawal of service offering meant additional costs, challenged resources, and increased transition timeframes.<br>•Additional data validation work might not be mandatory but necessary.<br>•Resource challenges at all levels impact timelines. |
| Challenge #4: Pandemic response | •Pandemic challenges interfered with progress of the transition as resources were diverted to address issues of COVID-19 response at the state, national, and provider level. |

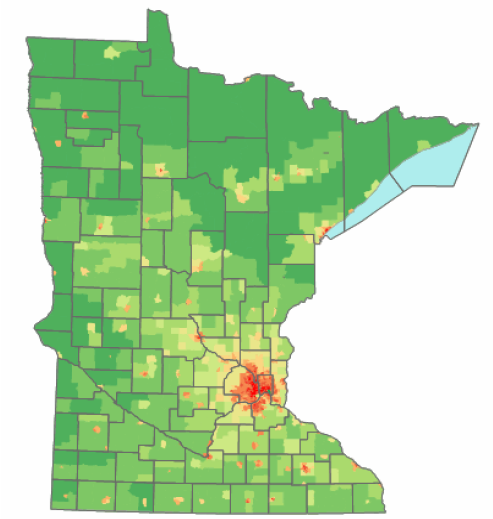
To further expound on the first two challenges, when trying to price the necessary network elements ICN asked for all-inclusive pricing. ICN experienced the same problem that South Dakota experienced and discussed in Chapter 2 of the Interstate Playbook. The state is only changing the central office POI from the selective router to the ICN aggregation points in the ESInet cloud and then to the two data centers in the state back to the PSAP. The determination of who has the authority to determine the POI is unclear and service providers have challenged the state's right to design the most appropriate network for their needs, thus adding unnecessary cost and implementation delays.

All telephone providers in Iowa have been charging the PSAPs transport from the PSAP to the selective router. However, there is no reliable way to determine actual costs of that transport and whether the charges for the service are reasonable. The tariff rates are not consistent and there is little correlation or explanation for what the charges are based on. The Iowa public utilities commission (PUC) deregulated landline service about one and one-half years ago (much like what was seen in North Dakota) and since that time, the determination of legitimate costs, and therefore budgeting at the local PSAP or state level, has been difficult, if not impossible, to validate against reasonable parameters.

## 2.5. Minnesota's Experience

Minnesota has an early version of the ESInet/NGCS solution in place today through a company we will call Provider A. The legacy 911 service providers aggregate originating service provider (OSP) end office traffic via the selective routers in each local access transport area (LATA)[3] to deliver it to the contractor's two data centers in Minnesota via Signaling System 7 (SS7) trunks. Minnesota has sought to procure the services of a network aggregator in preparation for implementing end-state NG911. At the time of this publication, the state had not completed contract negotiations with its preferred vendor. The state will move all OSP end office trunks to the aggregator for delivery to the current NGCS solution. The state plans to issue separate requests for proposals (RFPs) for an updated NGCS and egress network solution as the current contract is coming to an end. The egress network is the ESInet from the NGCS to the PSAPs.

Both Iowa and Minnesota are experiencing similar positions from their legacy service providers. In Minnesota, a strong coalition of independent telephone companies (telcos) and competitive local exchange carriers (CLECs) has dominated the conversation related to transitioning their end office trunks from the legacy network to NG911 networks. In Minnesota there were two legacy 911 providers hosting two separate ALI databases until recent changes implementing the statewide ESInet occurred. Provider A is a traditional large LEC whose service is present in many states. The second provider is a small, Minnesota-based provider serving mostly rural areas of the state, Provider B. Because of this complicating factor, the first step for Minnesota was to implement ALI steering between Provider A, the NGCS provider, and Provider B. There was some angst over manipulating and changing ALI records, understanding that ALI in legacy systems is the most significant factor of the system function, routing accuracy, and location information for call processing. Minnesota readily admits that there had been a lot of hand holding with smaller communities by Provider B. Most counties were afraid to move away from Provider B for ALI services, not knowing the outcome.



Another factor introducing complexity was that Minnesota was an early adopter of Provider A's solution for the ESInet using updated technology of an IP selective router (IPSR). Minnesota is not yet routing

[3] LATA is a term used in the U.S. for a geographic area covered by one or more local telephone companies, which are legally referred to as local exchange carriers (LECs). A connection between two local exchanges within the LATA is referred to as *intraLATA*. A connection between a carrier in one LATA to a carrier in another LATA is referred to as *interLATA*. InterLATA is long-distance service. The current rules for permitting a company to provide intraLATA or interLATA service (or both) are based on the Telecommunications Act of 1996.

based on GIS nor is it using the legacy selective router to route calls, but rather using the selective router as network aggregators at this point in the transition. This combination of using legacy selective routers to network aggregation points and ALI steering with partial NGCS end-state elements meant that new services needed to be intensely tested and the connection between the two ALI databases took more than a year to complete. The state needed to be committed to running dual networks until the combined systems could be successfully proven.

A third complicating factor was the many carrier trunks involved in providing service. Earlier we discussed the two service providers and the two different approaches to providing service to counties in Minnesota by these two providers. These two networks consisted of a total of 12 selective routers throughout the state. There are five LATAs[4] and multiple exchanges and service areas within a given LATA due to the robust independent telephone company coalition[5], which the PUC encouraged over the years. The two 911 service providers competed for customers and were often vocal about the perceived differences in their service levels. Previous experience in Minnesota has demonstrated that companies will provide 911 services under cost in order to secure other parts of the service that might be more lucrative.

Soon after the CLECs presented the market with competition for local telephone service, the state experienced a changing attitude by the PUC of limited to no interest in oversight of these new providers, preferring to allow the marketplace to deal with competitive environments and permitting the Minnesota PUC to take a back seat to regulation and not get intensely involved. These are very similar experiences of both Iowa and North Dakota.

The next phase is to complete the ALI migration and combine the data into one database and remove the duplicated services from the Provider B network and to migrate legacy central office trunks to NGCS. The state has requested pricing from its ESInet provider to complete this next step. However, delays and non-response from the ESInet provider has led Minnesota to issue an RFP to employ the services of an aggregator to take the ingress network to the next level by transitioning trunks from the central office selective router and move them to NGCS to start routing calls.

There are several ways that Minnesota can do this. One way is to aggregate all OSP end office trunks within the LATA to two POIs and then bring the IP traffic from the POIs to the two (dual) NGCS locations in the metro area belonging to its NGCS provider. The challenge will continue to be the mileage and transport costs from the OSP switch to the POI within the LATA, including the bandwidth charges from the POIs in each LATA to the two NGCS POIs. It also involves another provider company to monitor for outages and response time.

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[4] Minnesota Telephone Exchange Boundaries, March 2020. http://minnesota.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=a61fe43236994d43b097d439befb8e70

[5] Minnesota Telecom Alliance. https://www.mnta.org/

Since many of the OSPs have transitioned to IP switches, the second option would be to encourage each OSP to connect directly to the two NGCS POIs in the metro area via IP trunks. In theory this should reduce the transport costs for the state since many of these companies already send their IP traffic to one of the metro POIs to support their other business offerings.

Because the system will need to have instructions of where the ALI says to route the call, the ALI should migrate at the same time as the network. As with all transitions and service migration of data associated with the 911 call, the NGCS provider will need to ensure data accuracy within standards' recommendations. The goal is adherence to standards and keeping 911 data as clean and accurate as possible. There will be costs to the state involved in this process as well. Again, Iowa is seeing a similar situation; although the original cause of the situation is different, the result is the same—delays, higher costs, additional effort, and resources.

### 2.5.1. State Challenges

| | |
|---|---|
| Challenge #1: Procurement process vs. 911 requirements | •Understand network requirements.<br>•Technical expertise is needed.<br>•Highly complex and tailored services, not off the shelf. |
| Challenge #2: Price and cost differences | •Understand the difference between price and cost.<br>•Monitor service response objectives. |
| Challenge #3: Aggregation and coordination management | •Aggregation services add a level of complexity to the management of the service.<br>•Multiple legacy networks.<br>•Multiple LATA connections. |
| Challenge #4: Pandemic challenges resources | •Diversion of resources.<br>•Staff turnover. |

To further expound on the first challenge, state procurement offices need to understand the nuances and requirements of telecommunication networks, systems, and services, and sometimes do not have the technical expertise to assist. Sometimes information technology (IT) or engineering support is needed to define technical relationships and networks. Reliance on the state's 911 experts, providers or contractors must include confidence in trusted advisors to assist in the process. These are complex systems tailored to the needs of the 911 authority having jurisdiction and are not commodity items. This is sometimes difficult for procurement teams to comprehend and the need for subject matter expertise to assist the state can be essential to a smooth transition.

Regarding the second challenge, a key factor for consideration is that price and cost are not the same thing, and the cost component of a response should not be the overriding factor in vendor selection. The monitoring and service response time are key factors in supporting a 911 network, which requires five nine's reliability.

## 2.6. General Migration Process Steps

### 2.6.1. NG911 Strategic Planning

The Task Force on Optimal PSAP Architecture's (TFOPA), an advisory committee to the Federal Communications Commission (FCC or Commission), *Working Group 2 Phase II Supplemental Report: NG9-1-1 Readiness Scorecard*[6] and *Working Group 3 Report: Funding Sustainment Model*[7] identify the importance of a NG911 strategic plan. The duration of the planning process is strongly influenced by the project scope and implementation timeframe. Early decisions to be made in the implementation process include whether to manage the ESInet internally (owned and operated model), potentially requiring a build-up of in-state resources, or to allow a vendor to manage the ESInet (managed services model). It is important to evaluate the environment and identify operational, support, and related skills of 911 stakeholders. Documentation of the process needs to be thorough at every step, including planning, vendor selection, design, testing, implementation, monitoring and ongoing maintenance.

### 2.6.2. Optimum NG911 Architecture Decision Process

For every state, region, or individual 911 jurisdiction, decisions based on the needs of the community, available funding, technology capabilities, and operational requirements will have to be considered, discussed, and determined. Most often, best practices in the decision-making models followed by the 911 community include active engagement by appropriate stakeholders impacted by the outcomes of those decisions. Generally, decisions fall into four primary categories: governance, technology, operations, and funding.

Appendix C provides additional information and detail on the decision process to assist in developing optimum NG911 architecture for your state or jurisdiction based on standards and best practices.

### 2.6.3. Training

It is imperative that all PSAP administrators, supervisors, trainers, and staff understand any changes to call flow or workflow necessitated as a result of the change of selective routers (e.g., new dialing procedures for transfers, conferences, speed dials; how to report ALI/location discrepancies; how to

[6] "Working Group 2 Phase II Supplemental Report: NG9-1-1 Readiness Scorecard." TFOPA, December 2, 2016. https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG2_Supplemental_Report-120216.pdf
[7] "Working Group 3 Report: Funding Sustainment Model." TFOPA, December 2, 2016. https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG3_Supplemental_Report-120216.pdf

recognize and handle overflow or failover calls rerouted from neighboring PSAPs/jurisdictions; how to initiate rerouting if necessary, etc.).

## 2.7. Methods of Procedure

MOPs develop systematic, repeatable, and well-documented processes that produce consistent, measurable, with low risk, results. They are essential to a well-planned migration as a step-by-step sequence of actions to be executed by all parties. The purpose of an MOP is to control actions to ensure the desired outcome. States or local 911 authorities hiring migration services from a provider should insist on MOP details.

### 2.7.1. MOP Components

MOPs may contain different elements, information, and details depending on the complexity of the activity to be carried out and the probability and impact of a failure in its execution. For instance, the field “expected result of the action” could be added to every step in the procedure.

In order to be effective, an MOP needs to be followed as described and agreed to without deviation.

MOPs should also include additional information, including prerequisites, safety requirements, special tools and parts, procedure sequencing, and a back-out plan.

The most important parts of an MOP are the step-by-step instructions or procedures sequencing. Every step needs to be described in detail to indicate exactly what needs to be done and the expected result (e.g., alarms or indicator lights changing state, displays, location of call presentation).

Appendix D contains further information regarding components of MOPs.

### 2.7.2. Timeline

A timeline should be constructed that is a realistic assessment of the steps needed to migrate from the legacy selective router.

Appendix D also includes a high-level migration plan, as experienced by our Playbook participant states. The process steps and associated timeline is included as an example only. Each state or regional implementation will need to define their own timeline and process steps for their implementation.

***NOTE:*** *It is important for states, regions, and PSAPs to understand that transitioning to NG911 in a state is one thing, and that transitioning the legacy selective router is another. In some cases, many of the agencies (DOD, other local PSAPs in adjacent areas but outside of the jurisdiction, perhaps even in other states) may still be connected to and using a legacy selective router after one state or PSAP has transitioned, and the provider may have no impetus to move forward until those selective routers are fully transitioned, vacant of 911 traffic, or taken out of service by the provider.*

*We know that it is most efficient for the provider to transition the legacy selective router once PSAPs have migrated and ALI is being managed either with a transitional solution location database (LDB) or LIS. The reality is that in cases where the NG911 service provider and the legacy 911 service provider are not the same provider, there isn't a long standing precedent as how the legacy systems sunsetting will happen and "what else" has to trigger the event beyond the NG911 transition.*

*Therefore, having implemented NG911 doesn't specifically mean that the legacy selective router has been transitioned, so the state will have to ensure that there is clarity about those distinctions in the conversation with providers as it relates to the state fully implementing NG911.*

### *Considerations and Best Practices*

- Engage appropriate stakeholders in the decision-making process.
- Communicate early and often with local 911 authorities, vendors, contractors, providers, and carriers.
- Discuss and determine POIs/POPs (points of presence) and communicate that to providers.
- MOP requirements should be part of the contractual agreement for the service.
- Ensure the timeline is comprehensive and realistic.

### *Key Focus Points*

- Technology is the easiest thing—legal, regulatory, and costs are bigger problems.
- Legacy regulatory issues do not fit nicely or play well with NG911.
- In states where there is cost recovery, the small telco doesn't want to give up revenue and its costs are not controlled.

### *Support References and Recommended Reading*

- USDOT NG9-1-1 System Initiative's NG9-1-1 Transition Plan. https://www.911.gov/pdf/USDOT_NG911_Transition_Plan.pdf
- NENA Next Generation Partner Program, *A Policy Maker Blueprint for Transitioning to the Next Generation 9-1-1 System*, September 2008. https://cdn.ymaws.com/www.nena.org/resource/collection/B6781C63-012C-4E90-939B-001733976BBC/Policy_Maker_Blueprint_for_Transition_to_NG9-1-1.pdf

- NENA-INF-008.2-2013, NENA NG9-1-1 Transition Plan Considerations Information Document. https://www.nena.org/page/NG911_TransitionPlng?&hhsearchterms=%22ng911+and+transition+and+plan+and+considerations%22
- NENA Next Generation Partner Program NG9-1-1 Transition Policy Brief, *Confidentiality, disclosure and retention of 9-1-1 call and other emergency information.* https://cdn.ymaws.com/www.nena.org/resource/collection/B6781C63-012C-4E90-939B-001733976BBC/NG9-1-1_Transition_Policy_Considerations_-_Confidentiality.pdf
- NENA Next Generation Partner Program NG9-1-1 Transition Policy Brief, *Next Generation 9-1-1 Liability Issues*. https://cdn.ymaws.com/www.nena.org/resource/collection/B6781C63-012C-4E90-939B-001733976BBC/NG9-1-1_Transition_Policy_Considerations_-_Liability.pdf

# 3. NG911 Maturity Level Status

## 3.1. Overview/Background

While some 911 systems and agencies have made progress toward transitioning to NG911, many remain in the legacy state. The transition to NG911 requires commitments from many groups, including 911 governing boards, funding agencies, user groups, and vendor communities. Everyone acknowledges this has been a slow transition—just waiting for published and vetted standards has taken years. The slow transition has been impacted by many factors, including:

- Slow development of technical standards
- Standards that can be interpreted and solutions that can be implemented with variation
- Lack of understanding of the elements associated with a transition to end-state NG911
- Inadequate funding
- Current workload demands on agencies, which do not afford the time to plan for such a significant change

This protracted and uncoordinated implementation results in a patchwork of service availability across the country where a state, region, or even individual PSAP jurisdiction neighboring another might have very different levels of service.

The FCC appointed a federal advisory committee, TFOPA, to study and develop guidelines that will provide recommendations to the Commission regarding actions that PSAPs can take to optimize their security, operations, and funding as they migrate to NG911. One task for TFOPA was to further refine and define NG911 ecosystem components. A second ongoing task for TFOPA was to assist PSAPs, 911 authorities, other government entities, policy development groups, and all parties committed to NG911 in advancing more rapidly to “end-state” deployments. This assistance included the planning process, framework development, and implementation checklist (scorecard) development necessary to move from legacy to transitional to intermediate to fully deployed end-state NG911.

The TFOPA guidance, along with observations and documentation of the Interstate Playbook and the participant states, has assisted in outlining the activities some states are experiencing, in an effort to help others. It is hoped that by learning from and understanding the process followed in some states, a 911 authority will be better able to plan transition steps to move from legacy 911 to a fully functional NG911 end state. Additionally, by understanding essential NG911 system elements in each maturity state, a 911 authority will be able to plan for and budget transition strategies and costs.

## 3.2. NG911 Maturity Model and Transition Steps

911 professionals have been studying, learning, observing, and actively implementing the transition to NG911. They understand that NG911 services can be implemented in a variety of ways (e.g., phased, single-step implementation). Based on both anecdotal and actual experiences and information, a "phased" implementation has shown to offer the greatest opportunity for success. The NG911 Implementation Maturity Model is well-crafted and has been incorporated into TFOPA's *Working Group 2 Phase II Supplemental Report: NG9-1-1 Readiness Scorecard*[8] with only minor modification.

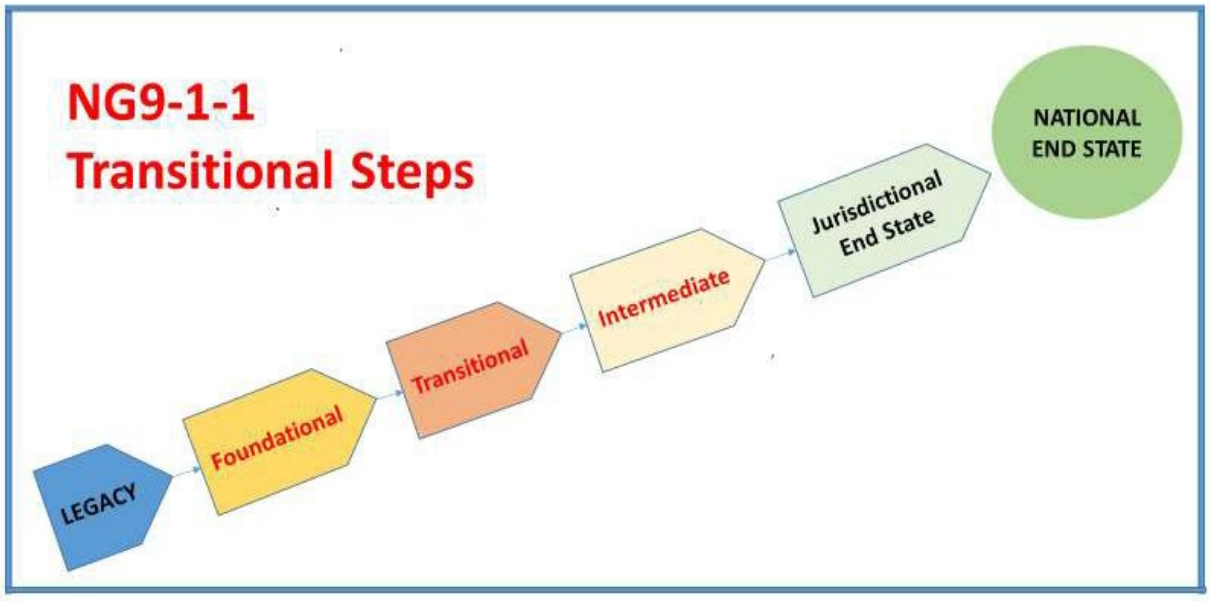



**Figure 5: TFOPA Maturity Matrix**

It is helpful in the process of documenting transition phases to NG911 to refresh the Maturity Matrix stages, as described by TFOPA, and to understand the maturity level of the four Interstate Playbook states as it relates to the transitional domains.

Maturity levels can best be described by milestones achieved, or in progress, to estimate which state most closely describes the progress toward NG911 migration.

[8] "Working Group 2 Phase II Supplemental Report: NG9-1-1 Readiness Scorecard." TFOPA, December 2, 2016. https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG2_Supplemental_Report-120216.pdf

**Table 1: Maturity Level Milestones**

| Maturity Level | Milestones |
|---|---|
| **Legacy** | • 911 services are provided by the traditional incumbent local exchange carrier (ILEC) using circuit-switched infrastructure<br>• ALI circuits |
| **Foundational** | • Planning for NG911 implementation is initiated<br>• NG911 feasibility studies are performed<br>• GIS data preparation begins<br>• IP networks (ESInets) may be implemented<br>• NG911 systems are not yet operational and system procurement is either just in the planning stages or just recently begun |
| **Transitional** | • Services have migrated partially from the legacy environment<br>• 911 services use an ESInet<br>• Emergency service number (ESN) routing is still utilized in a traditional manner<br>• This is the first stage in which certain NGCS elements may be implemented |
| **Intermediate** | • The 911 authority has implemented and made operational all i3 core functions within its control<br>• All calls are routed per GIS boundaries and location information (i3 algorithms)<br>• i3 PSAP multimedia call handling system (terminating ESRP[9]) is implemented<br>• Infrastructure and applications are being refined to incorporate advanced call and data-delivery interfaces<br>• Business and performance elements are maturing and are reviewed in regular intervals to optimize operations<br>• Governance agreements are in place and the model is functioning |

[9] Emergency Services Routing Proxy

| Maturity Level | Milestones |
|---|---|
| **Jurisdictional (local, regional state or tribal authority) End State** | • PSAPs are served by i3 standards-based systems and/or elements, from ingress through multimedia "call" handling<br>• OSPs provide SIP interfaces and location information during call set-up time<br>• ESInets are interconnected and providing interoperability according to established agreements, policies, and procedures |
| **National End State** | • PSAPs are served by i3 standards-based systems and/or elements, from ingress through multimedia "call" handling<br>• ESInets are interconnected providing interoperability that is supported by established agreements, policies, and procedures at a national level |

## 3.3. Self-Identification of NG911 Deployment Status

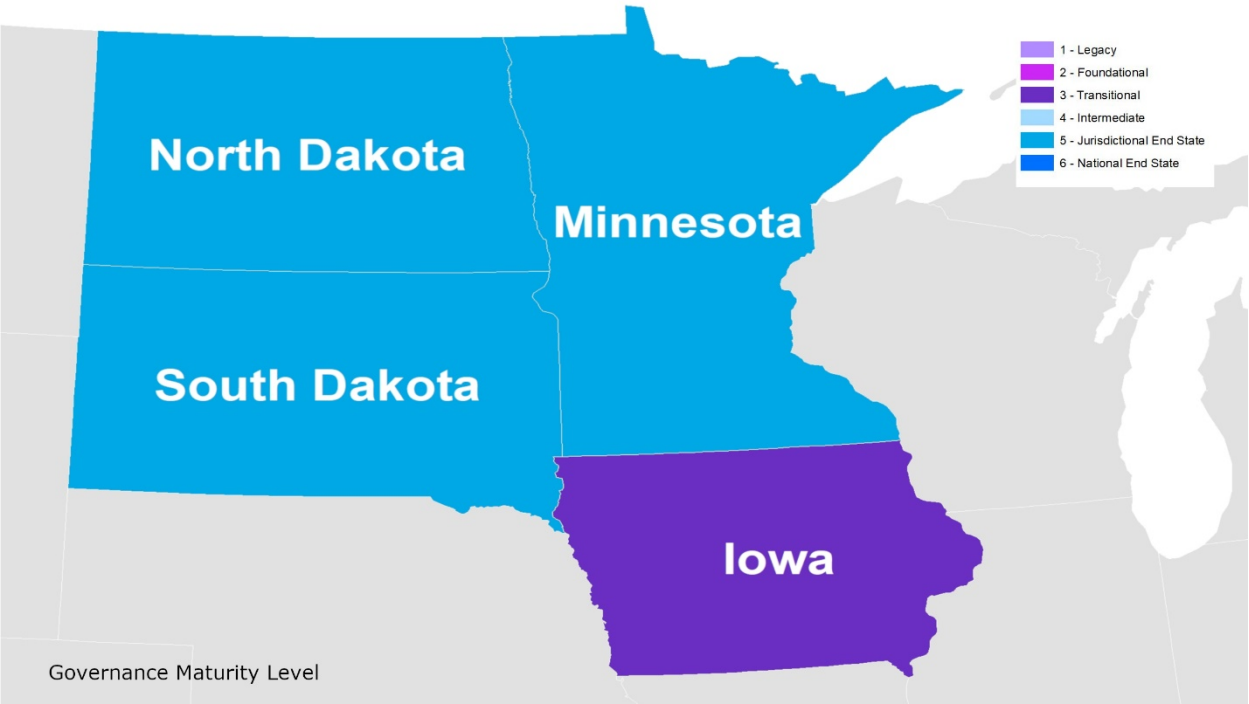
Each year, states are asked to determine their stage in NG911 transition progress maturity, using the descriptors above, for data collection for the *National 911 Progress Report*[10]. Fifty-three data elements, which help characterize a state's 911 operations, protocols, and progress towards NG911 implementation, is captured through the National 911 Profile Database. The data is submitted by states voluntarily for a calendar year (January 1 – December 31). The information collected seeks to provide the most complete and current information about 911 at the state level to support the development of effective policies, plans, and implementation strategies at all levels of government.

The Interstate Playbook uses the data from the database to understand the various levels of maturity for the four participant states regarding NG911 implementation. Not all categories are included here but those that are pertinent to the discussion and activities of this Chapter are shown in figures that follow. It should be noted that this is a self-reported maturity position determined by the respective state using the description of the category and its knowledge of respective progress. It is the best assessment that we have to track progress. It also should be noted that the data published in the 2019 report was collected for calendar year 2018. Continued progress toward NG911 implementation has been made by each participant state since the collection of the data. That progress will be reflected in the *National 911 Progress Report* to be published by the end of 2020 with data collected for calendar year 2019.

[10] "National 911 Progress Report." 911.gov, November 2019. https://www.911.gov/project_national911progressreport.html

### 3.3.1. Governance Maturity

"Governance addresses the structured oversight of the 911 Authorities and identifies whether there is a governing body with documented and tracked planning and implementation efforts. Coordination indicates whether all participating entities within the jurisdictional scope have agreed upon cooperation and going forward strategies and plans. Funding and Resources indicate that the funding and resources necessary to execute the NG911 plan have been identified or a strategy is in place to secure those funds and resources as necessary points during the plan execution. Governance structure is ongoing, providing the coordination and administration of the entire NG911 service system after implementation."[11]



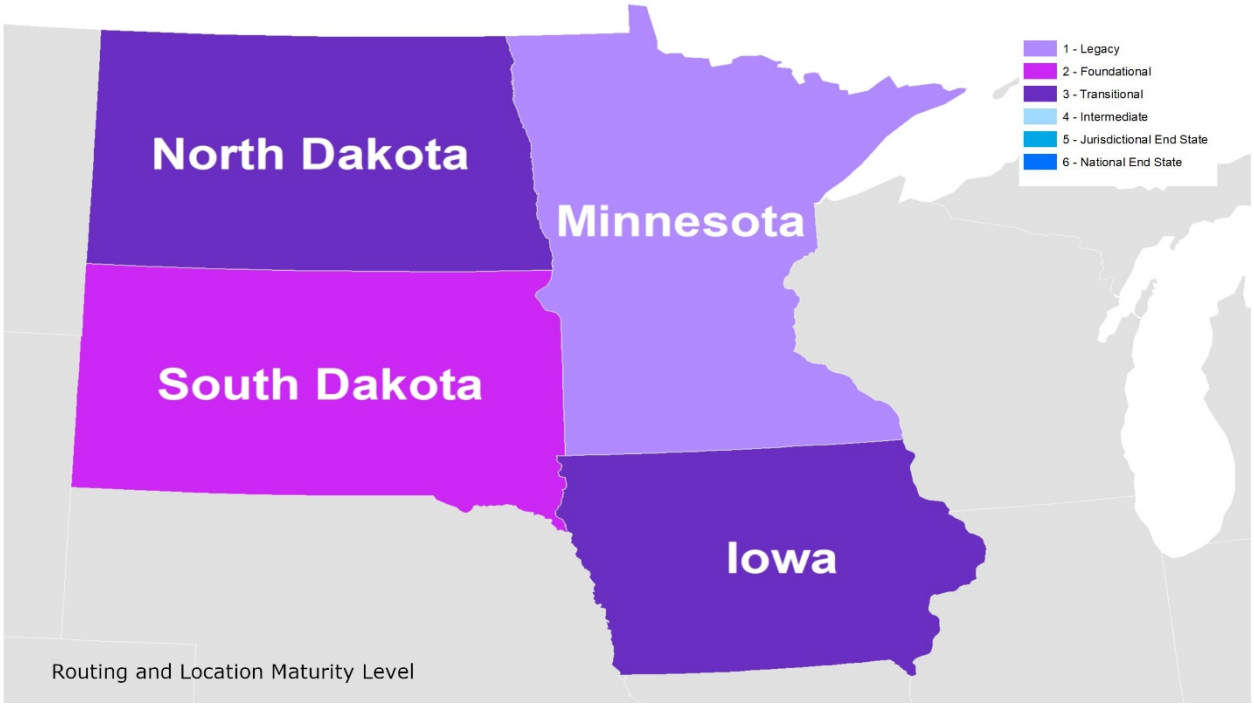

| | |
|---|---|
| IA | State statute recently changed to assign oversight of NG911 to a statewide office for both wireline and wireless services on to a single ESInet. State plan for NG911 adopted. Migration of wireline circuits to a wireless ESInet is in progress. |
| MN | State-level board of stakeholders sets overall guidance direction for emergency communications in the state and recommends standards; all NG911 activities coordinated through a statewide office. State plan for NG911 adopted. Funding to execute the state plan identified and budgeted. |
| ND | State plan for NG911 adopted. Funding to execute the state plan identified and budgeted. Statewide advisory board in place. |

[11] Ibid., 3.2.5.1.

| | |
|---|---|
| SD | State plan for NG911 adopted. All NG911 activities are coordinated through a statewide office. The statewide advisory board was established and operationally charged with oversight of 911 services and funding throughout the state. |

### 3.3.2. Routing and Location Maturity

"Routing and location defines the systematic approach that is used to determine 911 call routing and the supporting data functions. Legacy 911 calls are processed by relating the calling telephone number to an Emergency Services Number (ESN) that then defines the primary and secondary PSAPs *[based on static data in a data management system]*. NG911 utilizes geospatial routing by using the caller's location information and a set of PSAP jurisdictional polygons to determine the primary PSAP. A 'pure' NG911 implementation assumes OSPs have changed the means by which they deliver 911 calls, but it is not realistic or expected that OSPs will change together or even all complete their changes any time soon."[12]




| | |
|---|---|
| IA | Services have migrated partially from the legacy environment (wireless traffic), 911 services are using an ESInet for wireless service in the state, and ESN routing is still being utilized in a traditional way. Wireline service is migrating to the ESInet but transition is not yet complete. |

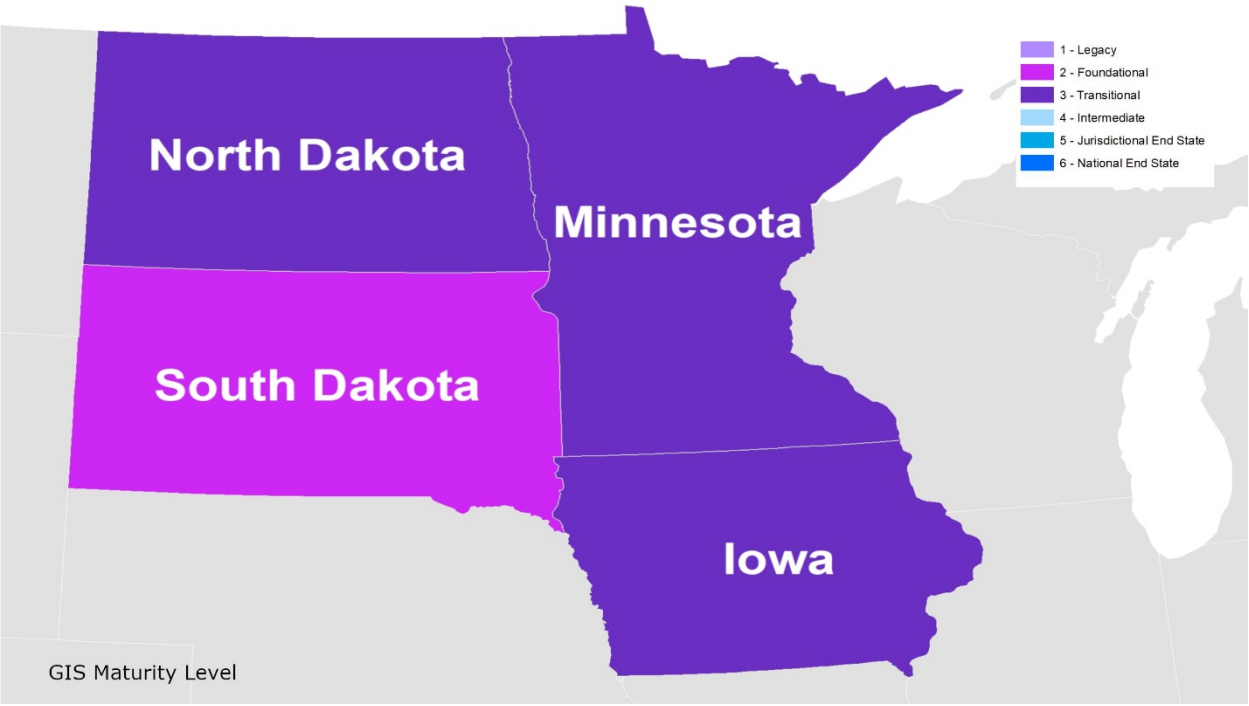
[12] Ibid., 3.2.5.2.

| | |
|---|---|
| MN | NG911 plan completed by Emergency Communications Network staff with stakeholder input and recommended by the advisory board for implementation guidance. GIS data preparation well underway; 97 of 102 PSAPs are receiving calls via an ESInet environment. NG911 system aggregation services not yet secured. |
| ND | Services have migrated partially from the legacy environment; 911 services are using an ESInet. All 22 PSAPs are receiving 911 calls via an ESInet; ESN routing is still being utilized in a traditional way. |
| SD | PSAP call handling has been upgraded but no ESInet was yet in place by the end of the data collection and reporting period (2018). By the end of 2019, some PSAP call handling had migrated. ESN routing is still being utilized in a traditional way. |

### 3.3.3. GIS Maturity

"GIS Data is a fundamental element of NG911 but is not utilized for legacy 911 call routing. These selection items define steps to plan, process, and utilize GIS data for NG911. Selection items are included that represent the NENA i3 functional elements that receive and utilize GIS data to complete call routing functions. The exchange of jurisdictional boundaries indicates an automated mechanism where an ESInet ECRF (or Forest Guide function) automatically keeps a neighboring ESInet ECRF (or Forest Guide function) updated with its jurisdictional polygons to allow for 911 call hand-offs and call transfers. GIS data is also utilized with NG911 for the Location Validation Function (LVF) and to support mapping services for the PSAPs."[13]

[13] Ibid., 3.2.5.3.

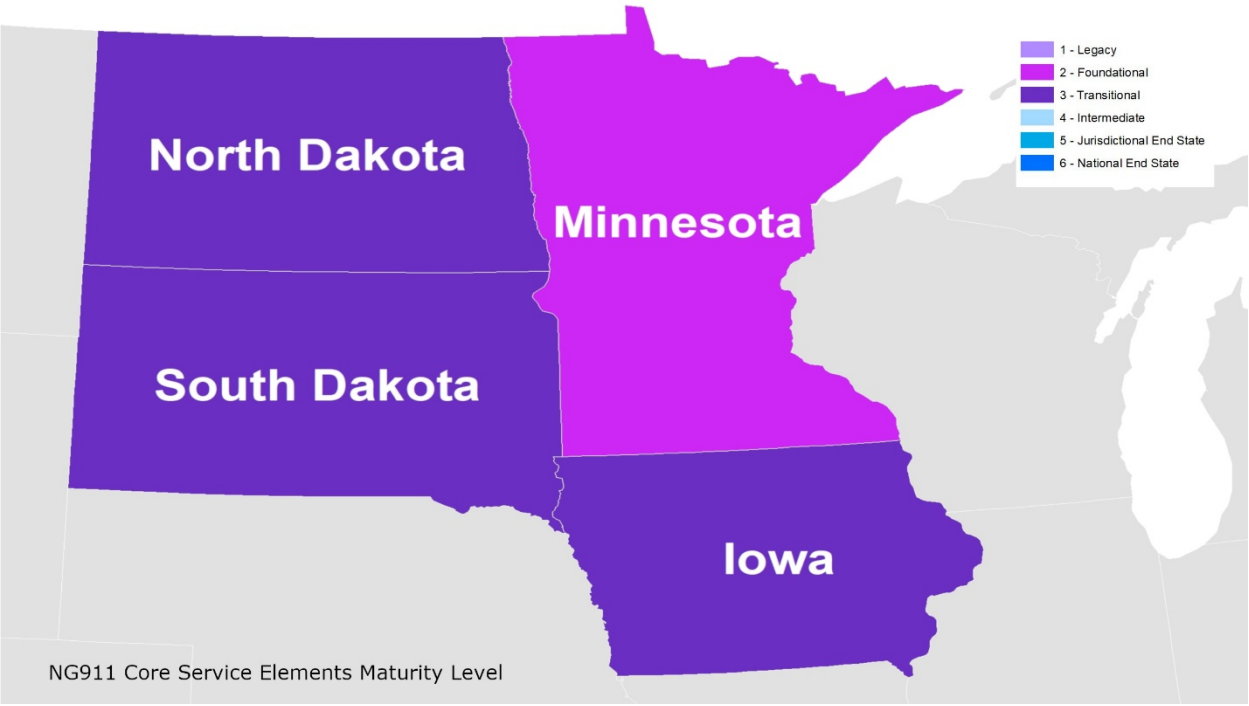



| | |
|---|---|
| IA | Services have migrated partially (all wireless service) from the legacy environment; wireline migration just beginning. |
| MN | GIS data preparation has started; metro area and largest percentage of population in the process of converting tabular data to GIS. |
| ND | Approximately 60% of the MSAG has been synchronized with the GIS data. All calls are routed per GIS boundaries and location information. |
| SD | ESN routing is still being utilized in a traditional way as GIS data accuracy continues to be worked on in preparation for geospatial routing. |

### 3.3.4. NG911 Core Service Elements Maturity

"The central Core Services functions provide the logical processing interactions between the delivery of calls and data from the OSE, additional data, and delivery to PSAPs, and provide the features to support management of how the NG911 service accomplishes this under normal and abnormal conditions."[14]

[14] Ibid., 3.2.5.4.

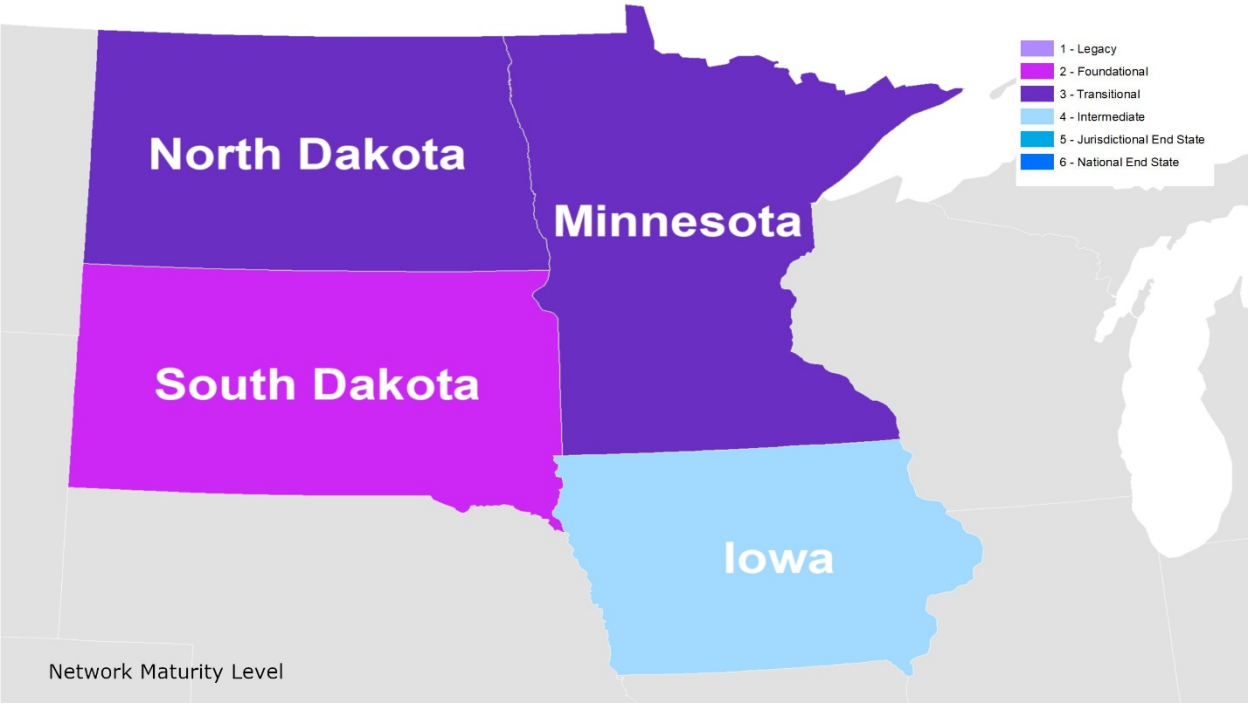



| | |
|---|---|
| IA | Some NGCS elements are being implemented; wireless 911 services are using the ESInet and wireline service is in the process of migrating to the same network. |
| MN | NG911 systems are not yet operational and aggregation of ingress network procurement is just underway. |
| ND | 911 services are using an ESInet; some NGCS elements are being implemented. |
| SD | ESN routing is still being utilized in a traditional way; services have migrated partially from the legacy environment. |

### 3.3.5. Network Maturity

"The network area capabilities represent the various technology mechanisms for connecting external entities to either a legacy selective router or functions within an ESInet for the purposes of processing 911 calls. Legacy call circuit mechanisms are primarily TDM based technology (e.g., SS7, CAMA) and NG911 moves to IP based technology … In some cases, IP technology can be deployed as a replacement for a legacy TDM technology before completely embracing the NENA i3 defined functional interface model, such as, an OSP using IP technology call delivery to an ESInet IP Selective Router without including a location object representing the caller's location. E2 Circuits are the legacy Wireless capabilities to retrieve location information and will be required until all OSPs that allow location update

transactions deliver caller's location information at call setup time. ESInet to ESInet connections will occur as neighboring jurisdictions implement ESInets and require the ability to exchange 911 calls."[15]



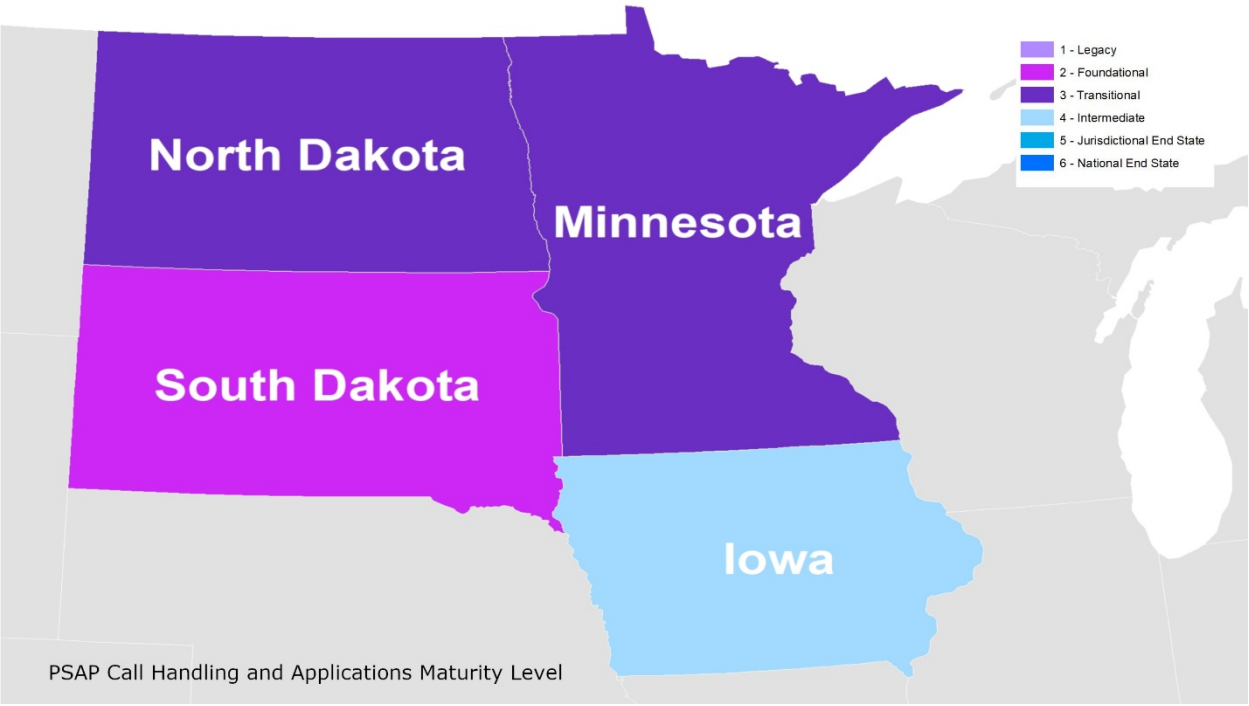

| | |
|---|---|
| IA | The 911 authority has implemented and made operational all i3 core functions within their control. All wireless calls are processed via an ESInet; migration of wireline circuits to a wireless ESInet is in progress. Infrastructure and applications are being refined to incorporate advanced call and data-delivery interfaces. |
| MN | The ESInet is in place; negotiating a contract for a systems aggregator for the ingress network. Currently IP technology call delivery is currently via an ESInet IPSR. |
| ND | 911 services are using an ESInet. Infrastructure and applications are being refined to incorporate advanced call and data-delivery interfaces. |
| SD | In 2018, 911 services were provided by the traditional ILEC using circuit-switched infrastructure. No ESInet was in place, at that time, but was in place by the end of 2019. |

### 3.3.6. PSAP Call Handling and Applications Maturity

"Legacy Call Handling Systems are defined by their use of CAMA trunk interfaces and legacy ALI interfaces. The first step toward NG911 is upgrading CHE to be IP technology based system and

[15] Ibid., 3.2.5.5.

optionally may include replacing the legacy CAMA TDM circuits with … IP technology … The NENA i3 defined functional entities interact with PSAP CHS and other applications via the IP based interface protocols referenced within the NENA i3 specification. An i3 PSAP would implement all the NENA i3 defined protocols … and the i3 compliant software to allow interaction with NG Core Service functions."[16]

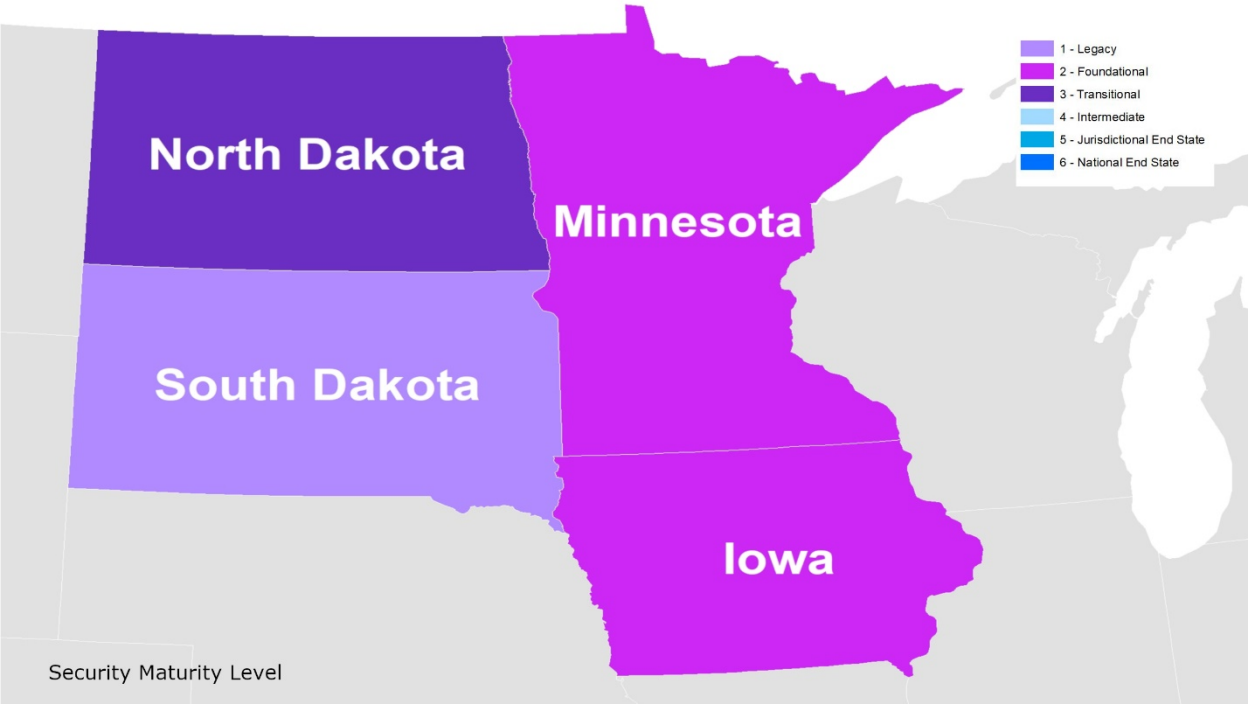



| | |
|---|---|
| IA | The 911 authority has implemented and made operational all i3 core functions within its control. Infrastructure and applications are being refined to incorporate advanced call and data-delivery interfaces. |
| MN | Services have migrated partially from the legacy environment; 911 services are using an ESInet. |
| ND | ESN routing is still being utilized in a traditional way. |
| SD | Planning for NG911 was initiated in 2018. NG911 systems were in the planning stages but not yet operational by the end of 2018 and, thus, are not reflected in this report. |

[16] Ibid., 3.2.5.6.

### 3.3.7. Security Maturity

"Security Maturity includes capabilities, operations and best practices expected at the ESInet, the NENA i3 functional elements, PSAP and all external facing interfaces."[17]

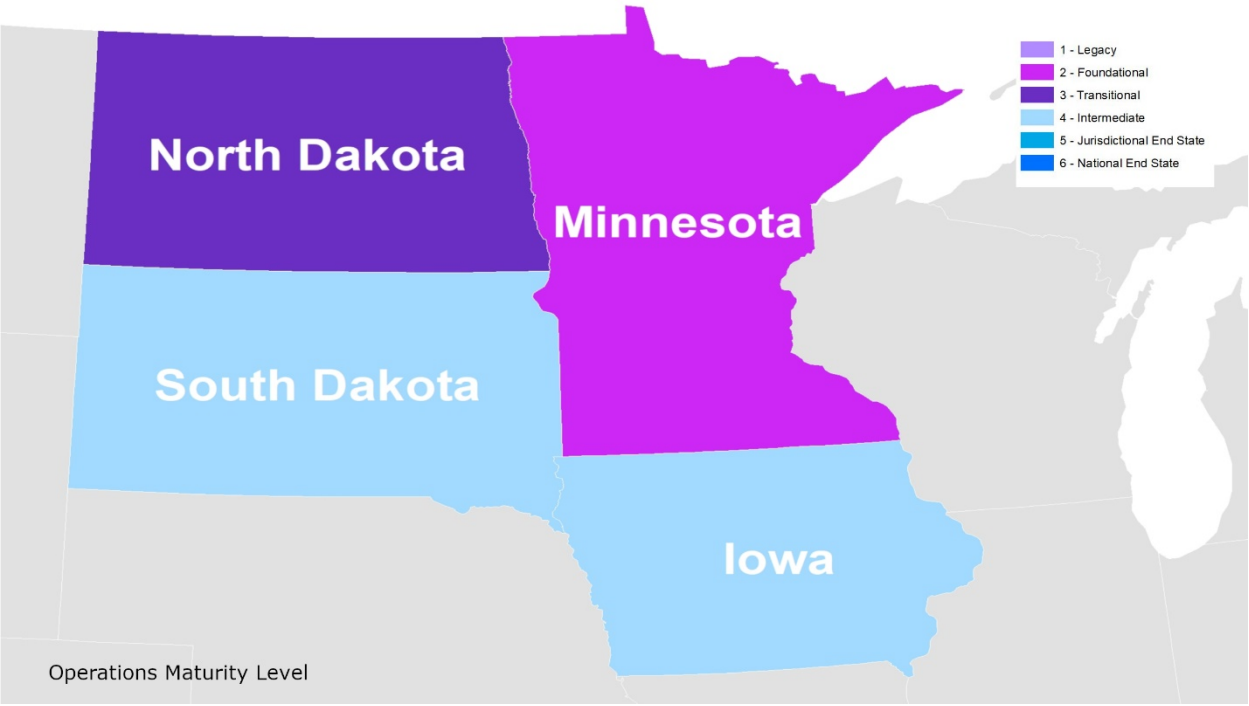



| | |
|---|---|
| IA | NG911 planning has been initiated; traditional ILEC providing wireline services. |
| MN | ESInet security specifications are a required part of the network. |
| ND | 911 services use the ESInet; security specifications are a required part of the network. |
| SD | 911 services provided by the traditional ILEC; there were no ESInet or security specifications in the 2018 reporting period. ESInet security specifications are now in place for the PSAPs that have migrated to the ESInet as of December 31, 2019 (10 PSAPs out of 28 migrated over in 2019). |

### 3.3.8. Operations Maturity

"Operations planning addresses aspects of execution, oversight, plan management and efforts to support on-going evolution with the planning of NG Core Services, ESInet and PSAP operations and the transition to the NG911 processing model and services."[18]

[17] Ibid., 3.2.5.7.
[18] Ibid., 3.2.5.8.




| | |
|---|---|
| IA | NG911 operational procedures development has begun; some are implemented. Some staff training has been conducted. |
| MN | NG911 operational procedures planning is underway; staffing assessment under consideration. |
| ND | NG911 operational procedures development has begun; some are implemented. Some staff training has been conducted. |
| SD | NG911 operational procedures development has begun; some are implemented. Some staff training has been conducted. |

## 3.4. Summary

Each year, the National 911 Program collaborates with NASNA to collect the identified data elements that are published in the *National 911 Progress Report*. Until this coordinated effort, there had been little data available to describe the status of NG911 implementation. The significance of collecting and reporting this data is increasingly important as communities, states, and all public safety emergency communications become more in need of tracking and assessing progress toward the goal of ubiquitous NG911 throughout the U.S.

### *Considerations and Best Practices*

- You should strive to understand the Maturity Matrix to evaluate your own state's transition progress to a full NG911 end state.
- Tracking progress is an important evaluation and reporting tool for your decision-makers and system funders.
- Data helps to clarify progress, educate and inform.

### *Key Focus Points*

- Every entity with whom your state, region, or individual PSAP will need to interface will likely be at a different stage of NG911 implementation.
- Being aware of the status of the NG911 implementation of neighboring states, regions, or PSAP jurisdictions is useful in the planning process.
- Continued progress in phases is necessary due to the complexity of the migration.
- Reliance on standards and coordination is essential for successful outcomes.

### *Support References and Recommended Reading*


- FCC, Task Force on Optimal Public Safety Answering Point Architecture (TFOPA), December 21, 2016. https://www.fcc.gov/search/#q=TFOPA
- National 911 Program, *National 911 Progress Report.* https://www.911.gov/project_national911progressreport.html
- SAFECOM National Council of Statewide Interoperability Coordinators (NCSWIC) NG911 Working Group, NG911 Self-Assessment Tool. https://www.911.gov/project_ng911tool.html

# 4. Disparate ESInet Service Provider Interoperability Testing

## 4.1. Background

Interconnection and interoperability of voice and data between ESInets has been a continued focus of the Interstate Playbook[19]. The need for ESInet interconnection and interoperability is important for continuity of service between states, regions, and/or PSAPs (also referred to as emergency communications centers [ECCs]). This linkage provides for the ability to transfer requests for assistance to the appropriate agency regardless of the solution provider. Each chapter of the Playbook demonstrates a progression towards the ability for i3 call transfers.

- Chapter 1 focused on establishing interconnection between states served by the same ESInet provider and demonstrates successful call transfers across state lines between Minnesota and North Dakota.
- Chapter 2 focused on text-to-911 transfers between the PSAPs in Chapter 1 and the next phase of establishing ESInet-to-ESInet connection to enable transfers between states or regions using disparate ESInet providers supporting legacy, transitional, and i3 transfers.
- Chapter 3 focused on the collaboration in the Maryland, Virginia, and Washington, D.C. area to address system interoperability, coordinated purchasing, and joint regional policy and decision-making strategies.
- Chapter 4 highlights what is needed to complete call transfers between two PSAPs that are served by disparate ESInet providers, including the collaboration of providers, the testing process, and test results.

TFOPA's *NG9-1-1 Readiness Scorecard* includes neighboring ESInet interconnections for call hand-offs and transfers as a part of the Network scorecard. States, regions, and PSAPs/ECCs bordering one another need ESInet interconnection to enable the hand-off and transfer of requests for assistance. Establishing connectivity between disparate ESInet providers requires many considerations. These considerations fall not only to entities looking to interconnect, but also vendors. This section highlights the need to establish lab-to-lab testing and considerations for enabling transfers in a production environment.

[19] https://www.911.gov/project_nextgeneration911interstateplaybook.html

## 4.2. Vendor Engagement

As more and more states and regions implement NGCS, establishing or maintaining the ability to transfer requests for assistance to neighboring PSAPs/ECCs requires support from the NGCS vendor(s) of each respective state or region. There are several considerations when seeking to connect neighboring ESInets, but it is a state's or region's responsibility to engage the vendor and seek support to facilitate interconnection and interoperability between NGCS providers. It is best that these issues are addressed in the procurement process and vendor contract negotiations to drive alignment of expectations and incorporate costs up front. However, this may be accommodated through change orders after a contract is in place.

There are several considerations when seeking to connect neighboring ESInets, but it is a state's or region's responsibility to engage the vendor and seek support to facilitate interconnection and interoperability between NGCS providers.

Upon agreement to support interconnection activity, the initiating and neighboring NGCS providers will need to collaborate and discuss respective agency requirements. States (or regions) should stay involved to understand the activities required as part of the project. As each step takes time, it is important that proper time is allocated as a part of the overall project plan.

In preparing for Chapter 4 of the Interstate Playbook, the NGCS vendors for Iowa and Minnesota participated in lab-to-lab testing. The steps involved in preparing for testing included:


- Establish a Non-Disclosure Agreement (NDA): Before sharing documentation and engaging in testing activity, the NGCS providers needed to complete an NDA between organizations. This is a common practice between providers that establishes confidentiality of information exchanged between parties. The process may take some time (two to four weeks), as each party needs to ensure review and approval from different levels in their respective organizations prior to signatures.
- Exchange Interface Specifications: ESInet and NGCS providers build specifications documentation as they develop their products and solutions. For this project, the specifications included the details necessary to support system-to-system interoperability. Each vendor may have different specifications based on the capabilities of the equipment and software deployed as a part of its solution. Each organization will need time to read, document, and ask questions

regarding specification content. Upon completion of an internal review, vendors need time to exchange information and discuss questions to help clarify content and expectations to establish a single, agreed-upon specification.

- Develop Test Cases: Each entity must agree upon the different test cases that will be completed as a part of lab testing. A majority of this work can be done in parallel with the interface specification review. This step involves collaboration between vendors in establishing expectations and setting success criteria, which helps ensure that there is a common understanding of the testing scenarios and expected outcomes.

## 4.3. Lab-to-Lab Testing

Lab-to-lab testing is an important step prior to establishing interconnection in production and allows vendors to test in a safe environment to address any issues prior to moving to a live environment. The vendors for Iowa and Minnesota worked collaboratively to plan lab testing by taking the following steps:


- Develop Test Cases: Prior to the testing that took place for the Interstate Playbook, the vendors determined that they would test using a transitional IPSR or pre-i3 solution. This was because both states were served by an IPSR solution and i3 standards had yet to be finalized for inter-ESInet call transfers.[20] It also was determined that the testing would include scenarios for three call types: wireline, wireless, and voice over IP (VoIP).

[20] At the time of writing, the draft of NENA STA-010.3-202x, also known as NENA i3v3, included a section detailing how inter-ESInet call transfers were to occur, but the standard was not yet ratified.

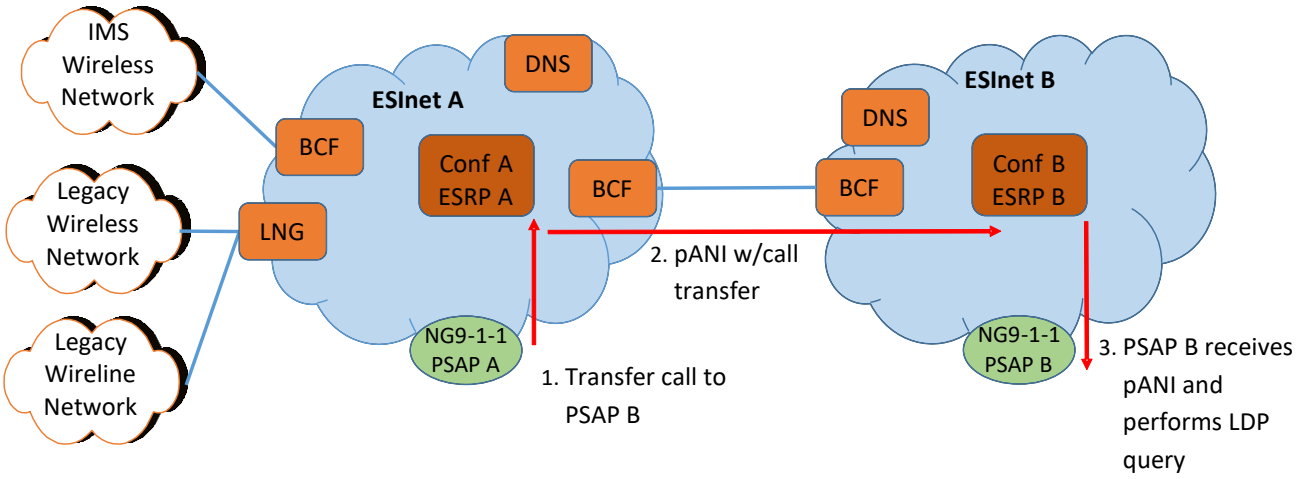



**Figure 6: Pre-i3 Solution**

- Preparation: Lab testing may require much advance preparation and notice as it is common for labs to serve multiple purposes. This allows organizations to prioritize efforts, identify resources, and ensure proper setup in advance of the needs of the project. It is important to identify the desired testing windows early in a project so that lab resources can be made available.
- Establish Connectivity: Once the window of time is identified, vendors need to establish connectivity between labs. The process of setting up a virtual private network (VPN) between labs can take up to three weeks or more and requires both parties to provide full VPN information to ensure proper functionality.
- Finalize Testing Details: While connectivity work is in progress, lab resources can work to finalize testing details. This includes the exchange of telephone numbers and data that will be required to complete testing and sharing the final test cases.
- Testing: Once connectivity is established and testing details agreed upon, vendor resources supporting lab testing need to ensure they have the final test cases and have time to complete any configuration necessary prior to the established testing dates.

## 4.4. Lab Testing Lessons Learned

Lab testing takes time and careful preparation, and using the steps included in sections 4.2 and 4.3, the vendors for Iowa and Minnesota were able to successfully transfer wireline, wireless, and VoIP calls between lab environments. The test case scenario document can be found in Appendix E.

Many lessons were learned that should be considered when planning for lab testing.

- Testing Window: A two-week testing window[21] was planned; because the testing was pre-i3, this provided sufficient time to successfully complete each test case. While testing took the full two weeks, it may have been completed sooner without the impacts of the COVID-19 pandemic. (Each vendor was impacted by stay-at-home orders the first day testing was scheduled.) While most work was completed remotely, the vendors both needed special accommodations during testing to allow individuals into the facilities to complete hands-on work in the labs.

- Call Flow: Setting up proper configurations took the majority of the testing window. Both parties needed to physically be onsite to reset systems, and this was slowed by the pandemic; however, once issues were resolved, testing was completed in a short period of time.

- ALI Data: The two teams used the ALI request/response process[22] to verify that the automatic number identification (ANI)/pseudo ANI (pANI) provided in the transfer message allowed the customer premise equipment (CPE) to bid for ALI data when receiving a transferred call. Consideration should be given to whether the legacy ALI request/response or the i3 HTTP[23]-Enabled Location Delivery (HELD) request/response process is in play for 911 authorities seeking to enable inter-state ESInet-to-ESInet call transfer capabilities. If one state uses i3 HELD request/response for in-state transfers and the other state uses legacy ALI request/response, this could introduce an issue.

### *Considerations and Best Practices*

- Disparate ESInet providers should be engaged early when discussing ESInet interconnection and interoperability of voice and data.
- Allow enough time in the project for disparate providers to complete an NDA and establish a testing window.
- Collaboration between vendors is important to ensure all parties agree upon and understand the interface specifications.
- Vendors will need time to agree upon the test cases that will be completed during lab testing.

### *Key Focus Points*

- State and regional resources should be informed by their ESInet vendors of the testing status throughout the project.
- The review and dialogue regarding interface specifications are important steps in preparing for interconnection and interoperability of disparate ESInet providers.

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[21] If an i3 call transfer method or other new technology was included in testing, a longer window would have been necessary.

[22] "E9-1-1 PSAP Equipment Standards." NENA-STA-027.3-2018, National Emergency Number Association. https://www.nena.org/page/E911_PSAP_Eqpt

[23] Hypertext Transfer Protocol

### *Support References and Recommended Reading*

- 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
- NENA-STA-010.2-2016, *NENA Detailed Functional and Interface Standards for the NENA i3 Solution.* https://cdn.ymaws.com/www.nena.org/resource/resmgr/standards/NENA-STA-010.2_i3_Architectu.pdf

# 5. Cross-Jurisdictional GIS Data

## 5.1. Background

Preparing for the transition from legacy 911 to NG911 is vitally important and may take more resources, people, and time than expected. If a jurisdiction has been diligent in ensuring the synchronization between the legacy databases (ALI and MSAG) and the GIS data, specifically the road centerline, transition will likely be a smoother and less time-consuming process. In many jurisdictions across the U.S., legacy databases and GIS data have been built and maintained in separate departments, by different people who may or may not be in regular communication with each other. The disconnected and fragmented maintenance workflow of these necessary and highly critical databases means that these databases are most often out of sync with each other and require a large number of updates to one, two, or all three.

## 5.2. Cross-Jurisdictional Coordination

The cross-jurisdictional coordination of NG911 GIS data in preparation for migrating the legacy 911 system to NG911 presents challenges for GIS within a single state as well as across state lines. While most local and state GIS programs are experienced in collaborating with their neighboring GIS authorities, NG911 requires a greater level of accuracy and more frequent collaboration.

The most difficult challenge in developing and maintaining cross-jurisdictional GIS data is lack of cross-ESInet validation. NGCS providers will validate GIS data prior to provisioning it onto the ESInet but should not be expected to coordinate with neighboring NGCS providers without oversight. There is a heightened risk of introducing errors into the NG911 environment between two or more ESInets if the topology and attribution of all datasets are not validated across all ESInets. The need to provide this validation service at the state level serves to both ensure state-to-state validation as well as validation between jurisdictions in a single state where 911 authorities are permitted to select their own ESInet provider.

## 5.3. NG911 GIS Data Model Standard

Adherence to GIS standards by all GIS data stewards is a vital first step towards data interoperability between neighboring jurisdictions. The *NENA Standard for NG9-1-1 GIS Data Model*[24] encompasses the requirements for both legacy 911 and NG911 database elements. The table below illustrates differences in requirements between legacy and NG911 data for road centerlines.

[24] NENA-STA-006.1.1-2020. https://cdn.ymaws.com/www.nena.org/resource/resmgr/standards/nena-sta-006.1.1-2020_ng9-1-.pdf

**Table 2: Comparison of Required Legacy and NG911 Data Elements for Road Centerlines**

| Legacy 911 Elements for the Road Centerline | NG911 Elements for the Road Centerline |
|---|---|
| Legacy Street Name Pre-Directional | Parity |
| Legacy Street Name | Street Name Pre-Modifier |
| Legacy Street Name Type | Street Name Pre-Directional |
| Legacy Street Name Post-Directional | Street Name Pre-Type |
| MSAG Community | Street Name Pre-Type Separator |
| ESN | Street Name |
| | Street Name Type |
| | Street Name Post-Directional |
| | Street Name Post-Modifier |
| | Country |
| | State |
| | County |
| | Incorporated Municipality |
| | Unincorporated Community |
| | Neighborhood Community |

The purpose of the legacy 911 elements within the standard is to ensure synchronization between the existing legacy databases and the GIS data, and to provide support for the MSAG Conversion Service (MCS)[25] and to support software utilizing GIS data in the PSAP. The purpose of the NG911 elements within the standard is to support all NG911 functional elements of the Emergency Call Routing Function (ECRF) and LVF, and to provide location information in a PIDF-LO format.

### 5.3.1. Provisioning Boundary

The provisioning boundary defines who can submit GIS data into the NG911 system for a specified area. The provisioning boundary must not overlap any other provisioning boundary. There is no difference in provisioning boundaries between PSAPs within a single state and the provisioning boundary between

[25] A web service providing conversion between the MSAG data and the Presence Information Data Format–Location Object (PIDF-LO). PIDF-LO provides a flexible and versatile means to represent location information in a SIP header using an XML schema.

multiple states. It is imperative, however, that interlocal agreements are developed between any two neighboring jurisdictions on different ESInets, establishing rules for implementing changes to a finalized provisioning boundary. It is critical for states to work with their local jurisdictions and neighboring states as early as possible to determine responsibility for developing these boundaries.

### 5.3.2. PSAP Boundary

The provisioning boundary also serves to define the full PSAP boundary for all 911 call traffic for the ECRF. In a statewide NG911 deployment that would likely be the state boundary, but consideration of any water bodies and how far offshore the boundary extends needs to be defined.

It is critical to ensure that states work with their neighboring states as early as possible to determine their boundaries before progressing to the counties/parishes and municipalities within each state.

## 5.4. GIS Considerations for Interstate Transition from Legacy to NG911

Many items must be considered prior to transition. Interstate transitional considerations include but are not limited to:

- Identification of areas where the legacy database for a single PSAP exists in multiple states. These interstate areas, covered by a single PSAP within the legacy system, occur for several reasons including:
    - Incorporated municipalities crossing state borders
    - Former or current exchange boundary restrictions controlled by selective routing
    - PSAP routing agreements between jurisdictions
- Investigation of all records falling into the neighboring state to determine if these records should stay within the existing PSAP area or if they should be transitioned to another PSAP. Often in legacy systems the primary PSAP area is limited by exchange boundaries or selective routing and during transition these limitations are removed and legacy records for call routing can be changed to the appropriate PSAP.

### 5.4.1. Identification and Coordination Between GIS Data Providers and 911 Authorities in All Impacted Jurisdictions.

It is important for the primary 911 authority to know and understand how GIS data is updated in their own, as well as neighboring, jurisdictions. Typically, GIS data is maintained and provided to 911

authorities by some combination of incorporated municipality and county or parish. Often GIS data providers are not aware of interstate PSAP boundaries prior to transition.

### 5.4.2. Data Synchronization

An end goal for NG911 is seamless GIS data across North America. To achieve operational success, GIS must not only develop a seamless dataset, but maintain data continuously with the pace of real estate development within each jurisdiction. This will require synchronization of each dataset with every neighboring jurisdiction when data updates occur. At a minimum, the state should provide oversight of the process to ensure that cross-jurisdictional validations occur. Ideally, the state will provide an aggregated feed of all NG911 GIS data within the state as a service, against which neighboring states can validate.

One state's lesson: The National Emergency Number Association's (NENA) best practices recommend that synchronization of legacy database fields in the GIS layers with the existing legacy databases of MSAG and ALI from the primary 911 authority is necessary and that it is important to modify the legacy street name fields in the GIS to match the existing legacy MSAG. North Dakota determined that, in its case, this is not the most desirable approach as it infects the GIS with the historically inaccurate MSAG records. Instead, North Dakota instructs its PSAP agencies to obtain their own GIS data from several reliable sources and then modify their MSAG to make it consistent with the GIS. This process is conducted while working with carriers to update their internal customer databases and, ultimately, the loaded ALI records. Once everyone has made their changes and all data is appropriately validated, the legacy MSAG data is exchanged with the GIS driven MSAG.

### 5.4.3. Data Submission to NGCS

911 authorities must work in conjunction with their GIS data provider(s) to ensure all GIS features for the entire extent of their PSAP coverage area are included for submission to their NGCS provider, even if those GIS features extend into neighboring states. Prior to and throughout the transition, the primary 911 authority must coordinate and enforce an agreement with the GIS data provider for submission of the GIS data for the entire PSAP area. These considerations would be reflected in the provisioning boundary layer.

#### *Considerations and Best Practices*

- Establish statewide standards, using NENA standards as a baseline, to include:
  - Statewide datum
  - Minimum data update schedule
  - Statewide schema
- Provide a cross-jurisdictional data validation toolset.
- Understand the data validation process in your state as well as neighboring states.

### *Key Focus Points*

- Consider investigation of all records falling into the neighboring state to determine if these records should stay within the existing PSAP area or if they should be transitioned to another jurisdiction.
- 911 authorities and their GIS data provider(s) must work to ensure all GIS features for the entire coverage area are submitted to the NGCS provider, even if those GIS features extend into neighboring states.
- The state should provide oversight of the process to ensure that cross-jurisdictional validations occur.

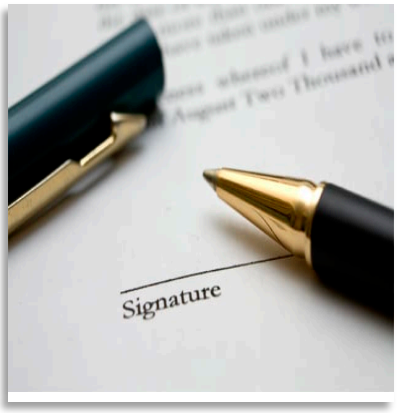
### *Support References and Recommended Reading*

- NENA-STA-006.1.1-2020, *NENA Standard for NG9-1-1 GIS Data Model*. https://www.nena.org/page/NG911GISDataModel
- NENA-STA-004.1-2014, *NENA Next Generation 9-1-1 (NG9-1-1) United States Civic Location Data Exchange Format (CLDXF) Standard*. https://www.nena.org/page/NG911CLDXF
- NENA-INF-014.1-2015, *NENA Information Document for Development of Site/Structure Address Point GIS Data for 9-1-1*. https://www.nena.org/page/SSAP

# 6. Interstate Cooperative Agreements

An interstate cooperative agreement (ICA)—sometimes known as a memorandum of understanding (MOU), a memorandum of agreement (MOA), or cooperative agreement or interstate agreement—is discussed in general in Chapter 1 of the Interstate Playbook. This Chapter 4 discussion also focuses on the need for an agreement required because of interconnectivity between states, in this case between disparate systems.

An ICA is a mechanism used by governing bodies and entities of authority to define the roles, authority, contributions, and cost allocation, if applicable, on which the parties have agreed as it relates to a particular subject. Such an agreement identifies the responsibilities of the parties, any financial obligations or understandings, demarcation of tasks or duties or even technology interfaces, and often is used to clarify policies and procedures the parties agree to follow that are mutually acceptable.




Informal agreements are fine for modest projects but a complex undertaking such as linking two or more state ESInets demands a more formal approach to how the jurisdictions will integrate their services. In Chapter 2 of the Interstate Playbook, an ICA was needed to define the interconnection between Minnesota and North Dakota for the transfer of calls from one state to another via the same ESInet provider. In this chapter, the need for an ICA between Iowa and Minnesota exists to define the interconnection between disparate ESInet providers. This scenario is likely to be more prevalent across the country.

A sample agreement between states is included in Appendix F. This sample should be considered **guidance only** and should be modified for your own state's needs and situation.

## 6.1. The Need for an ICA (or MOU)

Agencies use an ICA as the formal documentation of how they will cooperatively work together on an agreed upon project or meet an agreed upon objective. The main purpose of an ICA is to have a written understanding of the responsibilities and expectations of each party. An ICA should be a legal document, which is binding and holds the parties responsible to their commitment, or just may be a partnership agreement. Jurisdictions and agencies are familiar with these types of agreements and often will have them in place for call handling processes between counties or PSAP jurisdictions. There is less evidence that this type of agreement is a common occurrence between states. As NG911 moves forward, however, every state will ultimately have interconnection with all its border states. Thus, these types of interconnection agreements between and among states will become more common.

It is always wise counsel to engage legal departments or administrative agencies responsible for overseeing state agreements early in the agreement development process, especially between states as

each party's legal team will need to be consulted. Save time and energy by finding existing agreements between your states for other reasons and then draw upon already agreed to language to replicate in your NG911 agreement. This might be a transportation-related agreement, water management, park services, or other reasons. If agreed-upon language has already been developed for general clauses in an agreement, this simplifies the process for 911. Allow plenty of time for the process discussion and do not underestimate the time it will take legal departments to craft appropriate language for the agreement to which both states can agree.

In the agreement between Iowa and Minnesota, the states used the same agreement that had been executed and approved between North Dakota and Minnesota a year earlier. In theory, it was believed that because the Minnesota Materials Management Agency (MMA) had signed off on it previously, it should not be a conflict to use the same template again for the interconnection between Iowa and Minnesota, simply exchanging specific information and technical detail for the application between these two states. Same concept, different states. This was not to be, however, and a reissue with a new structure preferred by the MMA was required before the MMA would approve the agreement. This revision required the agreement to be sent back through the Iowa legal department to ensure that all components they had reviewed previously were intact and continued to be agreeable and that no material changes had been made to the language—a process adding resource expenditure in time and effort. Iowa's legal department did request a few minor corrections, which meant the agreement had to go back to MMA for approval. The point of this is to advise the reader that legal agreement language can take many iterations and multiple reviews by legal support teams, which require time. Do not underestimate how much time.

There are two primary reasons why a formal agreement is important. First, it will document each state's understanding of what will need to be done, define who is responsible, and outline the process that all parties have agreed to follow. Second, the agreement is good historical information and will be useful to codify what has been done, even if the principals currently involved no longer are in their positions.

**Agreement language** *Discover existing language that has already been agreed to*

- Find existing agreement language, perhaps for another purpose, that can be used
- Seek models betweent the two states that already have been agreed to

**Legal team involvement** *The process will take longer than you think*

- Engage your legal team early
- Provide them with a general idea of what needs to be accomplished and let them craft the legal language

**Consider the template** *Use the template provided as a starting point*

- Modify the template as needed

**Communicate** *Communicate frequently with the other state on agreement process and progress*

- Discover common methods and procedures to which both can agree as a starting point
- Tackle the easy agreement items first and develop a collaborative process

## 6.2. What Should an ICA or MOU Include?

Each section of the sample ICA/MOU contained in Chapter 1 of the Interstate Playbook, Appendix 3 – Memorandum of Understanding/Interstate Cooperative Agreement Sample, poses questions or concepts to consider or to help guide state(s) when writing content for an ICA and provides examples to consider. Sample paragraphs were also included for reference or to provide clarification on what might be included. It is important to note, however, that the sample paragraphs were intended for illustration purposes to help the jurisdiction build a specific ICA that is appropriate for its purposes. An ICA should be customized for the specific state need and standard that is used within the respective state. The language used in that sample document was drawn from several other example agreements among and between several disciplines.

While this Chapter 1 document does not address every issue that jurisdictions may face when seeking to establish an agreement, it may be helpful for the jurisdiction to consider all the factors that it might want to address. Some typical sections for consideration for inclusion in an agreement include:

- Terminology
- Effective date of the agreement and any reference to renewal or expiration dates if desired
- Contact information
- Change notification process—how each of the parties will keep others informed of any changes or service interruptions, operational procedure changes
- Change management process

- Records and documentation process
- Dispute resolution process
- Sovereign immunity
- Identification of authorized representatives
- State audit requirements
- Data practices provisions
- Provisioning, testing and verification process responsibilities
- Termination/withdrawal conditions and process
- Cost allocation
- Annual review and renewal of agreement

Please consult Chapter 1 of the Interstate Playbook for a full explanation of what should be considered in each section of the ICA:
www.911.gov/pdf/National_911_Program_NG911_Interstate_Playbook_Chapter_1.pdf

There are lessons learned that can be useful for others undertaking an endeavor of this kind, and there are tools available to help the jurisdictions through the process. Consult the template provided, begin the process early, get your legal teams involved, have a clear definition of what you want in an agreement, and formalize it in writing.

### *Considerations and Best Practices*

- Clarify the need for an agreement and the reason for its creation.
- What is to be accomplished by the agreement?
- Mutually agree on parameters and objectives for both/all the parties.
- Define lead agency (if applicable), responsibilities of the parties, mutually agreed upon timelines, and processes for review and update.

### *Key Focus Points*

- Clearly define and document expectations and responsibilities.
- Engage legal review teams.
- Formalize understandings and agreements in writing.

### *Support References and Recommended Reading*

- NENA-INF-012.3-2020, *NENA Inter-Agency Agreements Model Recommendations Information Document*. http://www.nena.org/?page=InterAgencyAgreemnts

- Department of Homeland Security, SAFECOM®, *Writing Guide for a Memorandum for Understanding (MOU)*. https://www.dhs.gov/safecom/governance
- National 911 Program, *Next Generation 911 (NG911) Interstate Playbook Chapter 1*. www.911.gov/pdf/National_911_Program_NG911_Interstate_Playbook_Chapter_1.pdf

# 7. Model State Legislative Language Review

## 7.1. Background

In early 2018, the National 911 Program convened a team of 911 stakeholders to modify and update the *Guidelines for State NG911 Legislative Language: Examples and Options for Legislative Language to Facilitate Deployment of Next Generation 911*, published in 2012, to help systems prepare for and implement NG911 capabilities. The updates included providing guidance on overcoming challenges inherent in today's technological landscape, accounting for shifts in how the public accesses 911 services, and detailed best practices and example approaches.

In late 2018 following a public comment and review period on the new document draft, the Program released the updated tool—*Guidelines for State NG911 Legislative Language: Examples and options for legislative language that facilitates the deployment of NG911*—which is available on www.911.gov, and hereafter referred to as the Guidelines.

The revised Guidelines include a roadmap for evaluating current statute and rule language and best practices for modifying legacy language in law and rules to accommodate advanced technologies of NG911. The ability to reference and pay for new NG911 network elements and the authority to advance NG911 in state plans is essential for 911 communications networks to move forward. In many cases, current statute does not permit state authorities to use 911 funds for the required services and must change to permit such uses of funds.

## 7.2. Use of the Guidelines

The use of the Guidelines to evaluate a state's statute as an exercise for others to learn from was a goal identified by the Interstate Playbook group. This review and comparison process was intended to provide any state with a process model and descriptive experience from which to assess the value for such a review for their own state and perhaps, in the process, identify in a constructive manner those changes to statute or rules that were necessary. The process involved selecting an existing Playbook participant state and using the Guidelines as the model to assess current statute and determine language that needed to be updated for NG911. Minnesota offered to undertake the exercise.

A template tool was developed, included in Appendix G, which listed all elements in the Guidelines. This template allowed the systematic review of existing language and a methodology for establishing an all-inclusive approach to changes that would improve the state's statute and prepare for NG911, from a technology, operational, fiscal, and governance perspective.

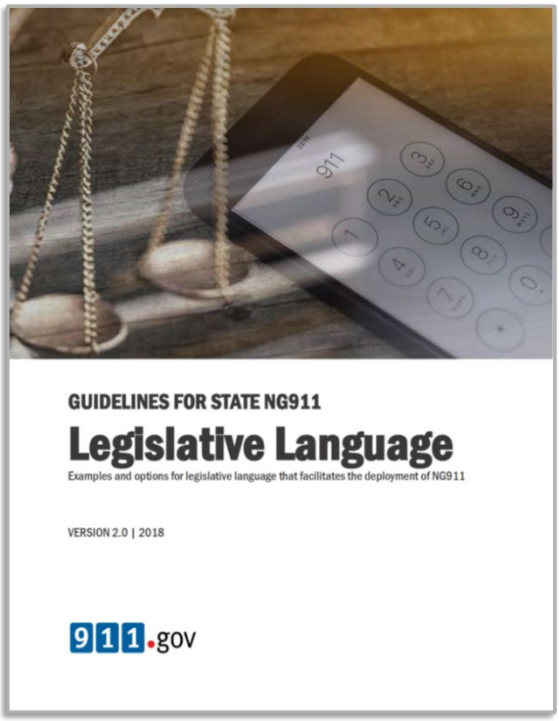
## 7.3. Process Steps for Legislative Language Review

1. Review of the Guidelines
2. Development of tool to assist in conducting the review
3. Comparison and assessment

i. Systematically go through the Guidelines
ii. Identify Minnesota statute references that compare with sections of the Guidelines
iii. Determine if existing language is adequate and allows implementation of state solution and strategic plan for NG911
iv. Record and document findings

4. Review of findings and development of next steps
5. Development of recommendations on statute changes to be proposed
6. Follow state process on statute change proposals

### *Considerations and Best Practices*




- The Guidelines are thorough and covers the full scope of elements to be reviewed to assist the state in assessing outdated legislative language and providing recommendations on changes to assist the state in moving updated legislation forward.
- The Guidelines provide helpful examples and wide-ranging sample language from other states that can illustrate changes that might be needed to prepare the state to progress the implementation of NG911.
- State statute is often complex and sometimes difficult to interpret. Assessing language by a methodical and comprehensive approach is the best way to identify gaps and challenges that require modification to allow for implementation of NG911 and clarity in process, authority, and funding.
- In addition to statute, the state may also need to consult rules or regulations related to 911.
- References in statute sometimes lead you to other statute references such as procurement statute, data practices, etc. Reviewing those related statutes is also important to ensure that all parts of the state's legislation are coordinated and integrated.

### *Key Focus Points*

- Consider using the template to structure the state evaluation process.
- Use the examples of other states to address gaps in your own legislation.
- Seek assistance from legal advisors.
- Engage staff in assisting with the assessment so that a coordinated approach to update operations and policies will closely follow changes and updates to legislative language.

### *Support References and Recommended Reading*

- National 911 Program. www.911.gov
- National 911 Program, *Guidelines for State NG911 Legislative Language: Examples and options for legislative language to facilitate deployment of NG911.* https://www.911.gov/pdf/Guidelines_for_State_NG911_Legislative_Language.pdf
- National 911 Program, *Guidelines for Developing a State NG911 Plan: Model plan and tips to facilitate NG911 planning for states and jurisdictions*. https://www.911.gov/pdf/Guidelines_for_Developing_a_State_NG911_Plan.pdf

# 8. State-Level Cost Challenges to NG911 Implementation

## 8.1. Background

Many states and regions across the U.S. are migrating from legacy Enhanced 911 (E911) service to NG911 service. This migration requires the support and involvement of the incumbent ESInet provider, NGCS provider, ILECs, CLECs, VoIP providers, some wireless providers, and all possible OSPs. The transition will involve changes in technology and interconnections that have been in place for years.

States are beginning to experience wide cost variations when migrating from legacy E911 systems to NG911 systems. One of the Interstate Playbook states, North Dakota, brought this issue to the attention of the Playbook participants noting that with deregulation of tariffs and lack of oversight by public service commissions, costs were not able to be validated for accuracy or validity. This situation made it difficult, if not impossible, to budget and plan for the costs of NG911 migration. For example, there is a cost associated with migrating ingress 911 circuits from OSPs to an ESInet, which is the transport component of an NG911 system. FCC rulings have determined that for some OSPs, such as wireless carriers, the cost of getting a 911 call to the 911 service provider switch is a cost of doing business; therefore, it is not required to be reimbursed by the 911 authority. However, the question of similar treatment regarding their competitors—wireline and VoIP OSPs—has not been clarified.

Once this issue was discussed by the Playbook participants, others added their own concerns and observations about cost variations and lack of constructive basis for the costs. Cost variations, unfair competitive advantages for some OSPs, and expenses that are uncontrolled or unmoderated by regulation result in confusion. This exacerbates situations where states are unprepared for the financial impact of migrating traffic from legacy telecommunications services to NG911. Facing the normal challenges of network transition with a lack of both control and knowledge of what options they have leaves many states and the 911 community vulnerable and without known options.

## 8.2. The Issues

In many cases, carriers are not held to the same expectations in every state: not all carriers are treated consistently. State laws and regulatory requirements vary, making it difficult to determine NG911 migration costs. Moreover, little guidance exists regarding what states might expect from OSPs regarding costs to plan and budget for the NG911 migration. This information is essential to determine and justify NG911 migration cost projections to decision-makers.

Today's regulated telecommunication tariffs for ILECs and legacy CLEC services are based on cost studies and a reasonable rate of return that is allowed by a regulating authority, such as a state's public utility commission (PUC) or public service commission (PSC). Generally, non-regulated service prices are kept in check through competitive pricing offered by multiple providers. When OSPs migrate to an NG911 backbone, there is no opportunity to competitively bid the migration. This situation enables some OSPs to price services without any documented basis. Pricing that is not based on thorough and detailed cost

studies of what the service actually costs to provide, coupled with a lack of competitive bidding, makes it difficult to know whether the pricing is reasonable.

Many OSPs are becoming VoIP service providers to avoid what they perceive as the burden of regulation. But in most cases, these service providers have not been required to remove the tariff for the old service and institute charges that are based on actual costs, so they continue to use that tariff as their basis for 911 charges even though the service is no longer the same. Their networks have changed and the cost for those networks has changed, but charging based on previous technology persists.

An exploration of existing legislation and regulation, as well as other reasonable investigative practices, may be helpful to inform state 911 authorities of the current landscape as they move forward with their NG911 migrations in the most cost-effective manner.

### 8.2.1. Wireline

In legacy E911, connectivity that links the E911 provider switch to the local 911 authority PSAP has long been considered a cost of the 911 authority. That the E911 trunk charges to connect the redundant selective routers and the ALI to the PSAP is not in question. However, confusion and lack of clarity exist regarding the point of demarcation, specifically the costs of the connectivity between the local wireline OSP central office and the 911 service provider switch. The figure below depicts the legacy wireline costs.

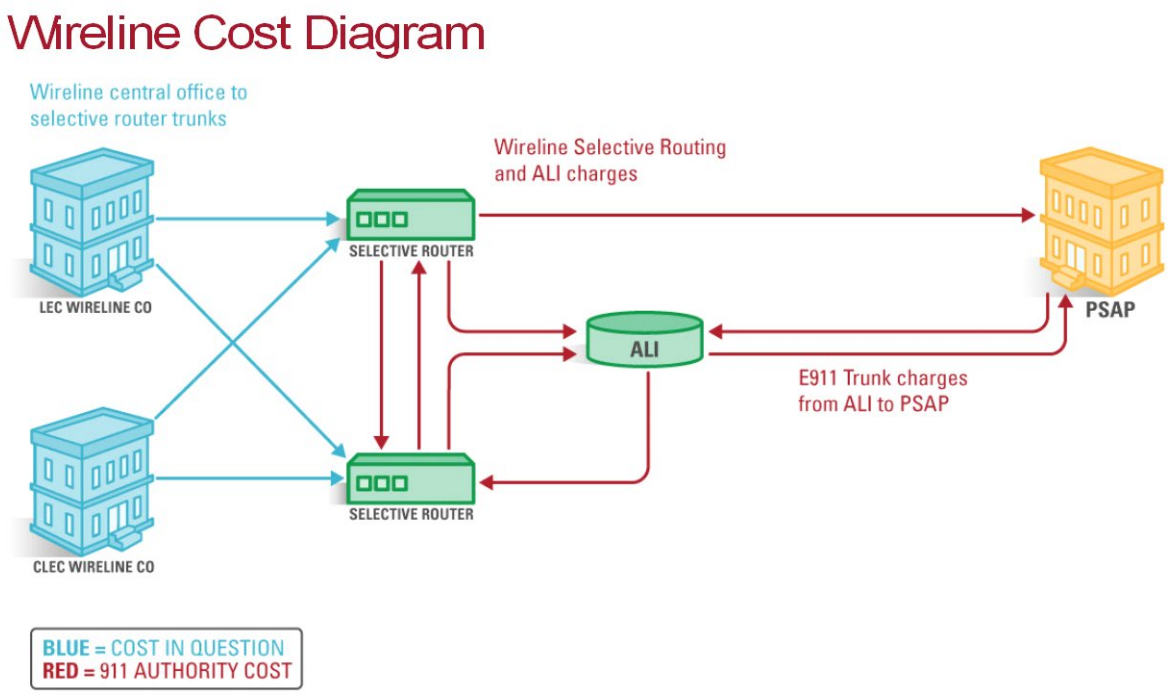



**Figure 7: Wireline Costs**

### 8.2.2. Wireless

In the case of wireless 911 service, it has been determined through the King County Order that the connectivity from the wireless carrier's mobile switching center (MSC) to the 911 service provider switch—selective routers in legacy systems and LNGs in NG911 systems—is the responsibility of the wireless carrier, because the hardware and software components and functionalities precede the selective router.[26] This is different treatment than wireline OSPs are afforded, as noted above. However, there are some wireless carriers that do charge for these circuits in some states.

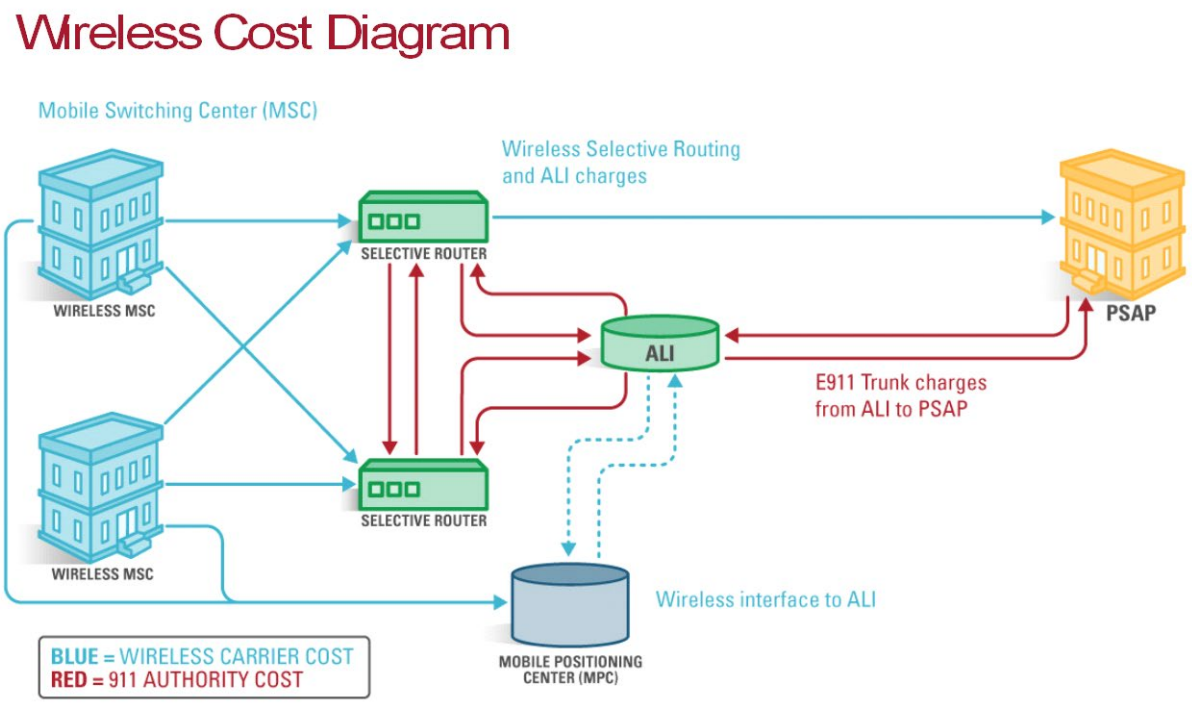



**Figure 8: Wireless Costs**

[26] *Order on Reconsideration in CC Docket No. 94-102*, 17 FCC Rcd 19012 (25)
"Revision of the Commission's Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems: Request of King County, Washington." 2002. https://www.fcc.gov/document/revision-commissions-rules-ensure-compatibility-enhanced-69

### 8.2.3. NG911

In the case of NG911 systems, the LNGs take the place of the legacy selective router. The responsible party for paying for the connectivity between the local OSP central office and the LNG has been determined by FCC order, but in practice is inconsistently applied across the U.S.

The figure below illustrates the issue in an NG911 environment.

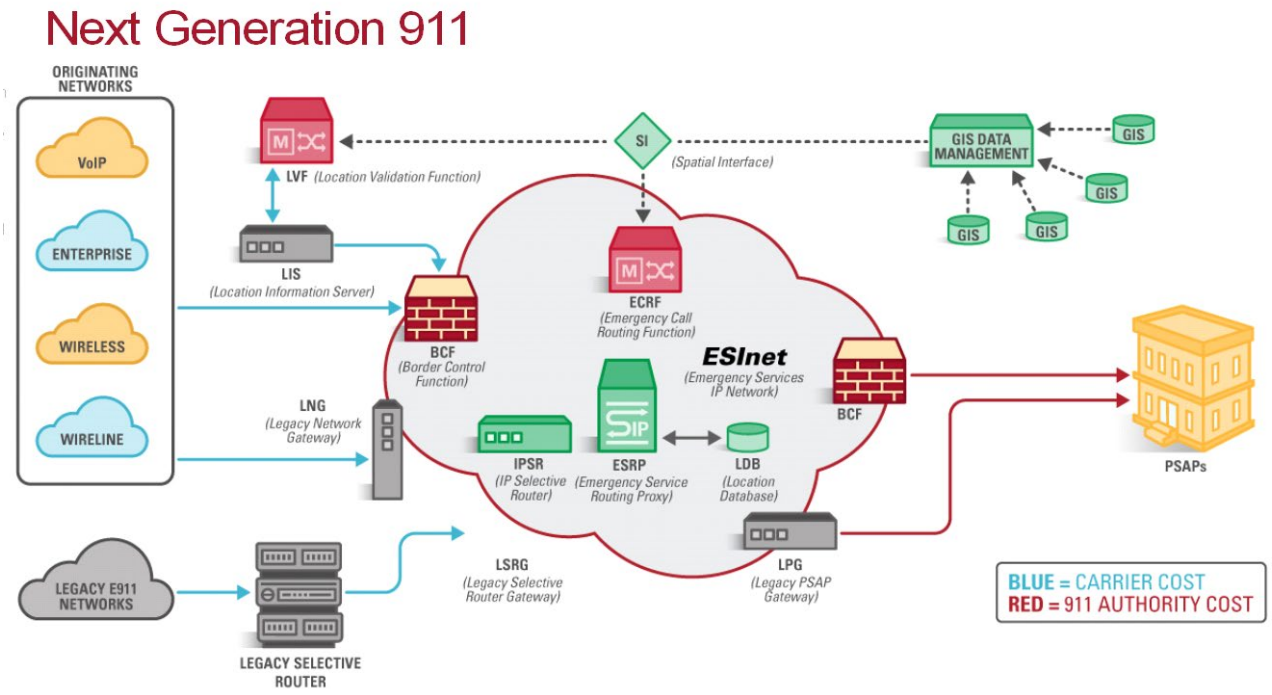



**Figure 9: Standard NG911 Configuration**

### 8.2.4. Summary

Guidance on this topic depends heavily on the individual states. In the past, numerous states have provided cost recovery to OSPs, with some exceptions for ILECs and legacy CLEC services.[27] And some wireless carriers—despite the FCC ruling that it is not required—continue to charge cost recovery, and some states continue to pay even though they are not required to. Some states have since stopped paying wireless cost recovery, however, relying on the FCC's ruling. This situation has become more confusing over time, driven by assumptions, technology changes, and the migration to NG911.

[27] For the purposes of this discussion, cost recovery in a legacy wireline environment means the provider's practice, generally via a filed and approved tariff with the state PSC, to charge the 911 authority for the connectivity from a local central office to the provider's switch.

These issues present difficult questions for states that are struggling to allocate, budget, or fund the NG911 migration. For example, states and local 911 authorities are faced with financing two networks—legacy and NG911—for the duration of the migration. In some cases, migration will take a protracted period of time, putting a fiscal burden on already-challenged budgets. Some states' 911 authorities have asked:

- Should cost recovery be limited to a certain period of time or a specific milestone, such as when all of a specific entity's 911 traffic has migrated off of the existing legacy equipment (e.g., the selective router), rather than when all 911 traffic from all entities has migrated?

- If delivery of a 911 call to the selective router is determined to be the cost of doing business for wireless, why should *any* carrier be permitted to receive cost recovery, such as the ILEC or CLEC? Moreover, why should some carriers receive this benefit and not others? If the wireless carrier, as determined by the King County Order, is not required to receive cost recovery, why should other carriers (ILECs, CLECs or VoIP providers) be allowed to charge and receive payment for the same connectivity? This creates an unfair competitive advantage when a wireline OSP can charge for connectivity that a wireless OSP does not.

- Is getting a call to the E911 or NG911 system the OSP's responsibility, thus simply a cost of doing business, as it appears in the FCC obligation to transmit 911 calls Order?[28] Shouldn't 911 authorities expect that the costs for 911 call delivery will be borne by the 911 system service provider to the selective router in a legacy network, and the LNG or border control function (BCF) in NG911?

- Similarly, OSPs also may also try to establish charges for ALI changes, uploads of geospatial data, and storage of new data needed for NG911. Without guidance or regulation, these charges may be whatever the market will bear, leaving the state or local 911 authority at the mercy of negotiation. If this is a cost of doing business, is it a legitimate cost that should be borne by the customer or a cost that the local 911 authority or the state should pay as they did in the past for ALI? These questions are asked but no clear answer has yet been determined.

These questions and others are plaguing state system architects and financial planners and need to be answered. The topic of 911 service costs has been discussed by state 911 directors for a long time, but as more and more states and entities progress their migration from legacy E911 to NG911, the level, scope, and volume of the dialogue has exacerbated questions raised in the conversation. There is no question that there is growing concern over the lack of clarification about cost recovery for both legacy and NG911 systems as states and local 911 authorities struggle to finance two systems during the migration to end-state NG911.

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[28] "Obligation to transmit 911 calls." 47 CFR § 9.4. https://www.ecfr.gov/cgi-bin/text-idx?SID=92419986a642fb31e8bb230833cfe49e&mc=true&node=pt47.1.9&rgn=div5#se47.1.9_14

While we have seen regulatory bodies preferring to let the market play a role in managing costs, competitive bidding is not a sustainable option. Additionally, states may not wish to let the market take care of the issue without some government oversight. As a result, states will continue to question if it is fair to allow varying treatment of OSPs to create unfair competitive practices, when the 911 authority has little control over the cost of the service or the options available.

Many state 911 authorities are keenly aware of—and interested in—what other states are beginning to confront, and the concerns this situation pose.

The issue has been escalated to NASNA for further exploration and discussion. Until the issues discussed in this section have more clarity and more research is done regarding how costs are determined, the transition timeline and process to NG911 will continue to be challenged by unverified costs.

### *Considerations and Best Practices*

- States and local 911 authorities should share cost information from providers with neighboring states and authorities for awareness and comparison.
- Communicate issues with state PUC/PSC for awareness and guidance.
- Do not hesitate to report concerns, document cases, and collect examples and responses to these situations to illustrate the issues and explore solutions.
- The states should determine a reasonable and fair demarcation point for network connectivity and aggregation of service from multiple providers in the state. This should be communicated to the potential NGCS and ESInet respondents to an RFP.

### *Key Focus Points*

- Costs are no longer established and set by communication tariffs for the most part.
- PUCs/PSCs are less likely to regulate carriers/providers in the future.
- Services that are not competitive will be difficult to determine costs until the provider is selected or responds to an RFP. Escalation of these costs over time will need to be controlled by contract to control costs and estimate budget needs.

### *Support References and Recommended Reading*

- *Order on Reconsideration in CC Docket No. 94-102*, 17 FCC Rcd 19012 (25); Revision of the Commission's Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems: Request of King County, Washington (2002). https://www.fcc.gov/document/revision-commissions-rules-ensure-compatibility-enhanced-69
- Rural Call Completion, FCC Fourth Report and Order, WC Docket No. 13-39 (February 22, 2019). https://docs.fcc.gov/public/attachments/DOC-356303A1.pdf
- Improving Rural Call Quality and Reliability Act of 2017 (P.L. 115-129), https://www.congress.gov/115/plaws/publ129/PLAW-115publ129.pdf
- Communications Act of 1934 (P.L. 73-416) https://govtrackus.s3.amazonaws.com/legislink/pdf/stat/48/STATUTE-48-Pg1064a.pdf

- 47 CFR § 20.18(d)(2000)https://www.ecfr.gov/cgi-bin/text-idx?SID=4c936e4cd4de893df6c00992f3a0d39e&mc=true&node=pt47.2.20&rgn=div5 https://www.govinfo.gov/content/pkg/CFR-2000-title47-vol2/pdf/CFR-2000-title47-vol2-sec20-18.pdf and Thomas J. Sugrue, Wireless Telecommunications Bureau Chief, FCC, correspondence to Marlys R. Davis, "Re; King County, Washington Request Concerning E911 Phase I Issues" (May 7, 2001). https://www.911.gov/pdf/FCC_Response_King_County_Washington_Request_E911_Issues_2001.pdf

# 9. PSAP Credentialing Agency and NIOC

Best practices in current web services administration require secure communications over securely managed networks. This requirement necessitates enforcement of certain standards and regulations and the approval and sharing of security certificates issued by a "root of trust" authority to ensure security requirements are met and can be relied on. NENA has established an independent NG9-1-1 Interoperability Oversight Commission (NIOC)[29] to oversee programs related to NG911 interoperability, the PSAP Credentialing Agency (PCA), and the NG911 Forest Guide (FG). NENA provides administrative function for NOIC, including administration of the contract with the PCA administrator and fiscal responsibilities.[30]

## 9.1. Background

Critical infrastructure (CI) industries with special security requirements, such as public safety and military, will routinely establish a shared public key infrastructure (PKI) independent of the general trust framework for the internet, with a shared root of trust specific to that industry, in our case, the 911 emergency communications industry. The rationale for industry-specific PKIs is to establish trust within a specific industry and for special purposes. NG911 is one such field.

In the NENA i3 standard, the PCA is a root of trust entity. The PCA enables an NG911 solution to initiate communications with another NG911 implementation using a certificate that identifies it as a verified 911 entity allowed to establish a connection. The PCA allows for and promotes interoperability by enabling a requester system to establish a secure connection with any other certified system in the NG911 ecosystem using its credentials that mark it as a known and validated 911 entity.

It is safest for an entity system to provide connectivity to a completely unknown entity if both share the same root of

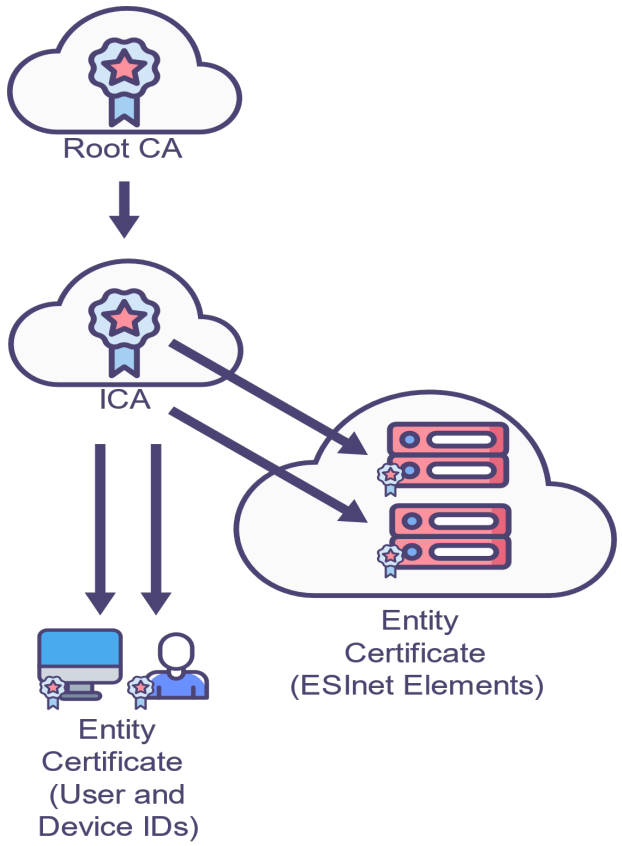


**Figure 10: Trust Chain Using X.509 Certificates**

[29] Nussman, Chris. "NENA Welcomes Establishment of NG9-1-1 Interoperability Oversight Commission." National Emergency Number Association, February 5, 2020. https://www.nena.org/news/488043/NENA-Welcomes-Establishment-of-NG9-1-1-Interoperability-Oversight-Commission.htm

[30] Much of the information in this section and section 10 is from the NIOC's bylaws, which can be found at https://ng911ioc.org/wp-content/uploads/2020/06/NIOC-bylaws-4-15-2020.pdf, and the NIOC website, which can be accessed at https://ng911ioc.org/. Graphics are used by permission.

trust exclusive to NG911, because only legitimate 911 entities will have a certificate with credentials traceable to the NG911 PCA.

Technically speaking, the PCA and its PKI operate no differently than how Certificate Authorities[31] (CAs) and X.509 certificates[32] are handled over the public internet. A root signs a root certificate, and that root CA is secured offline. The root CA only signs certificates for issuing CAs, and then end-entities (like web servers) get certificates from issuing CAs. The unique part of a PKI—including the PCA and the NG911 PKI—is that they share a credentials security by certificates traceable to a common root certificate, as opposed to the general public internet, which shares several hundred root certificates operated by a variety of companies.

## 9.2. The Need for a PCA

The NENA i3 standard requires that the PCA be established and that credentials throughout the NG911 ecosystem are traceable to the PCA. Without a functional and activated PCA, no NG911 deployment can fully conform with the standards and ensure secure interoperable communications. It is important to be aware that:

- Generally, all internet transactions via IP require a secure connection
- Even routine transactions, like web browsing, require security, due to vulnerabilities like man-in-the-middle attacks (shown in the figure below)[33]
- To establish a secure connection, one party must confirm with the other party that they are who they say they are
- PKI establishes a chain of trust
- NG911 standards (i3) require that the PCA be created for the NG911 chain of trust

[31] Certificate Authorities operate as shared roots of trust within the general public trust framework over the general internet.

[32] "X.509 certificates are used to help users identify a secure connection and X.509 certificates create a key pair in order to bind a specific user to a certificate, ensuring privacy and legitimacy for users within companies or larger organizations." SSLAuthority®. https://www.sslauthority.com/x509-what-you-should-know/

[33] "A Man-in-the-Middle (MITM) attack occurs when hacker successfully intercepts any online communication (social media, email, web surfing etc) happening between two systems. The attacker relays and alters the communication. However, the parties involved think that they are communicating with each other over a secure and private connection. The hacker can target any of the private information inside a device too." https://www.askcybersecurity.com/man-in-middle-attack/#:~:text=Man-in-the-Middle%20cyber%20attack%20%E2%80%93%20When%20the%20hacker%20gets,systems.%20The%20attacker%20relays%20and%20alters%20the%20communication

- The PCA is a CA for NG911
- NENA has established the PCA to fulfill standards requirements

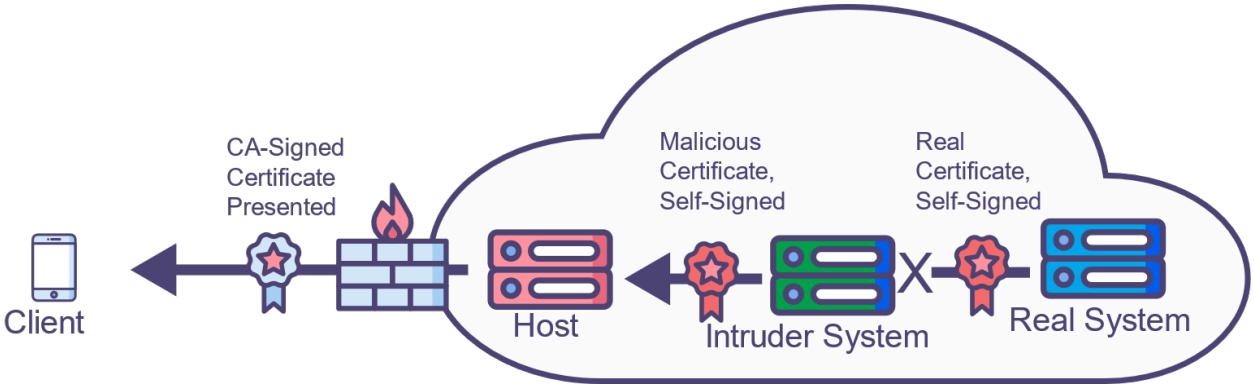


**Figure 11: Typical Man-in-the-Middle Attack Exploiting Self-Signed Certificate Vulnerability**

A recent magazine article from NENA's *The Call* included an interesting analogy to help explain the concept of credentialing and its importance to NG911 call processing and data transmission.

> Imagine cargo ships steaming toward a seaport. The ocean represents a data-transfer network, such as the internet, or in a Next Generation 91-1 *[sic]* (NG9-1-1) environment, an emergency services Internet Protocol network (ESInet). The ships represent data packets and the cargo represents actual data. A decision has to be made regarding whether to allow the ships to enter the seaport—which is analogous to the receiving entity in a data transaction—and whether they will be allowed to unload their cargo. Such decisions are made by the port authority, which represents the credentialing agency, based on policies. Finally, the cargo must be unloaded, and the tools for doing so in a data environment are the public and private keys, and the digital signatures and certificates.[34]

[34] Brothers, Chad, PMP, ENP and Sehnert, Dave, ENP. "A Key To Unlocking Enhanced Cybersecurity." *The Call,* Issue 35, National Emergency Number Association, 2020. https://www.thecall-digital.com/neng/0120_issue_35/MobilePagedArticle.action?articleId=1584652#articleId1584652

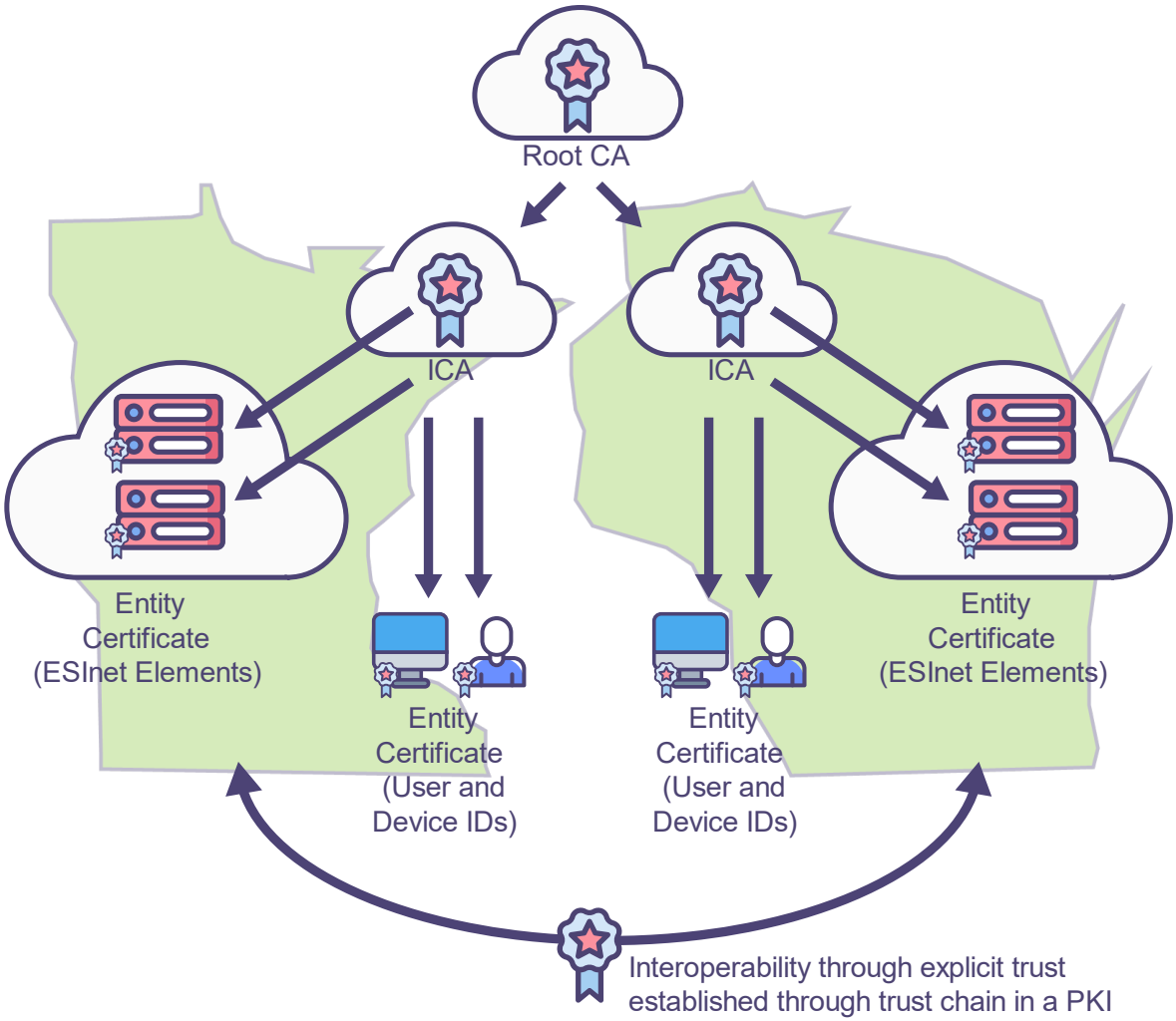


**Figure 12: Shared Root Providing for Explicit Trust**

Although the i3 standard assumes that there is a single CA that serves as the root, a PKI can have multiple CAs at the root, if they are cross-signed by each other. This increases complexity and reduces security, however, as each root's trust chain is exposed to the other root's trust chain when cross-signing. For example, consider the case that the PCA cross-signs with the CA, which sits at the root of trust for the STIR/SHAKEN PKI. Cross-signing in such a way may simplify some authentication mechanisms for receiving emergency calls and for placing call-backs from an NG911 PSAP. Any compromise of the STIR/SHAKEN trust chain will also compromise NG911 authentication mechanisms until the governing and managing entities for the STIR/SHAKEN root can take corrective action to address the compromise. The members of the NG911 trust chain have no agency in this corrective action and may simply have to wait for it to happen.

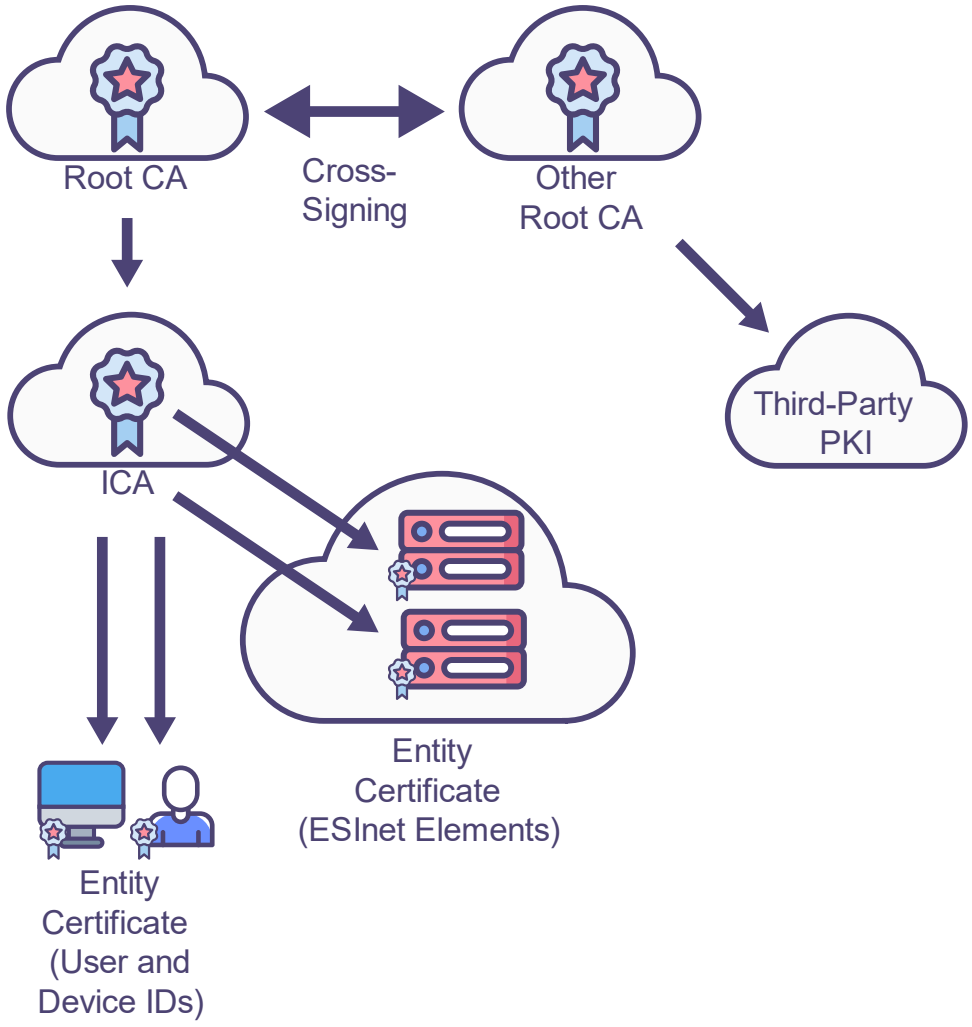


**Figure 13: Cross-Signing of Root CAs**

## 9.3. Governance

As noted previously, NENA established NIOC, an independent commission, and has committed to provide administrative functions, including administration of the contract with the PCA administrator and fiscal responsibilities. NIOC consists of members representing a variety of stakeholder groups involved with the NG911 PKI, including a state member, local member, NGCS provider, a PSAP member, the National 911 Program (federal member), the FCC, a public safety association member, and an elected official. NENA's Board of Directors will appoint members, after nominations, to NIOC, which will operate under established bylaws.

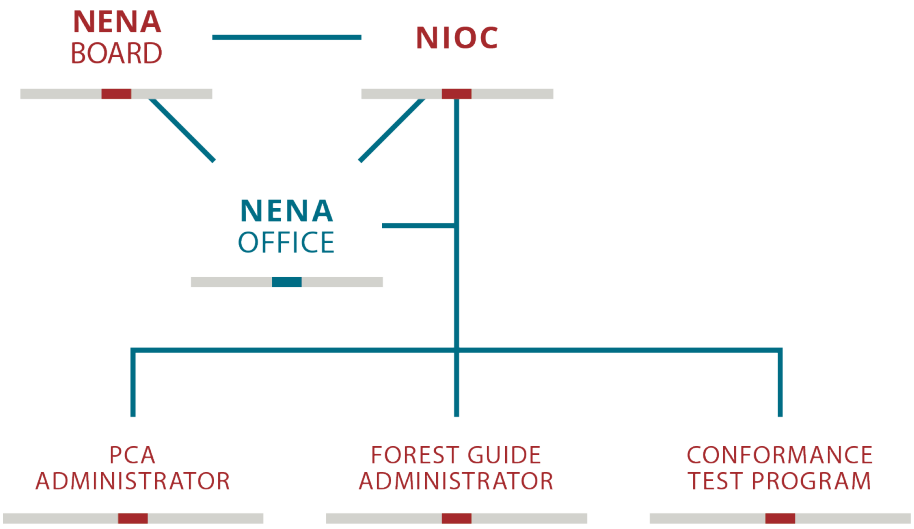


**Figure 14: Relationship Between NIOC and NENA**

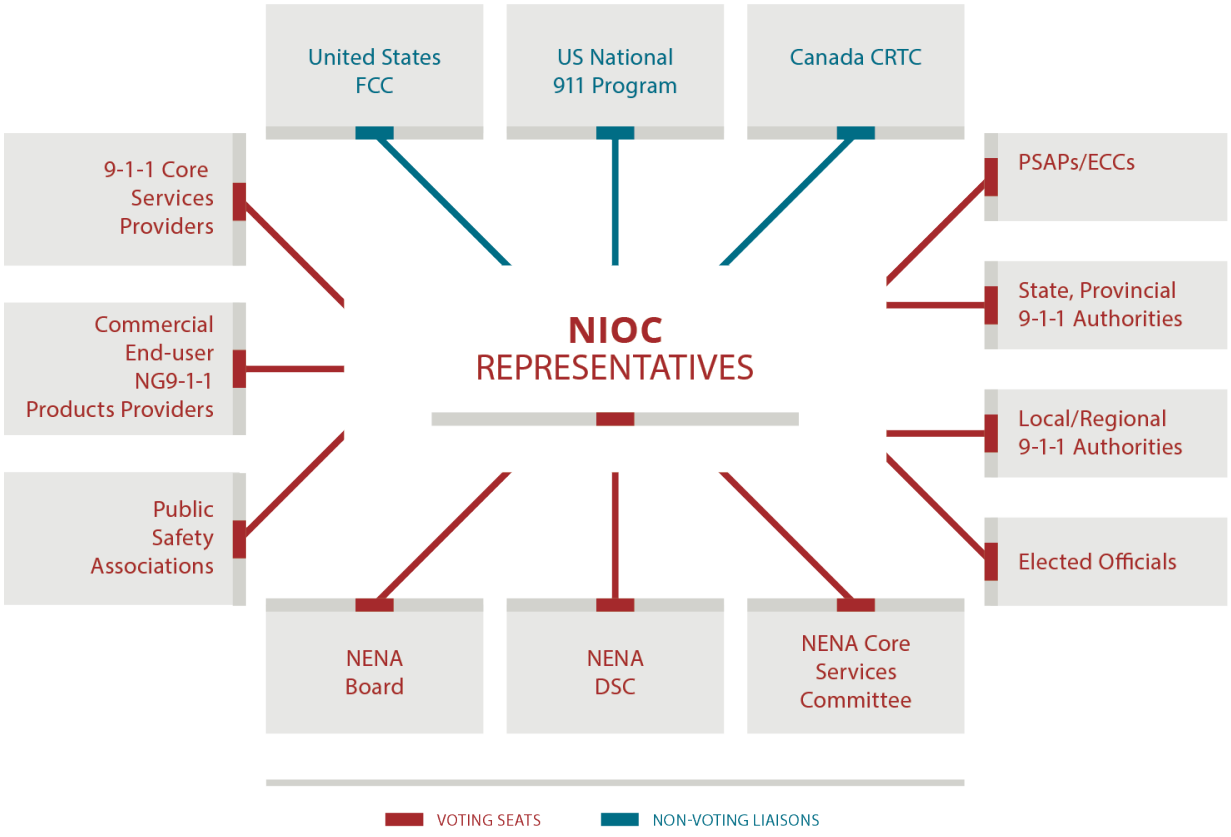


**Figure 15: NIOC Membership**

### 9.3.1. NIOC Responsibilities

NIOC's mission is to oversee programs related to NG911 interoperability, the PCA, and the NG911 Forest Guide. These programs are required in standards disseminated by NENA and the Internet Engineering Task Force (IETF) to promote security and interoperability for NG911, as well as discoverability and fallback for routing queries.

Responsibilities of NIOC include[35]:


**Figure 16: NIOC Responsibilities**

### 9.3.2. PCA Responsibilities

The PCA must be administered by a neutral party without a profit motive. NENA, under oversight by the NIOC, is considered as this neutral party for the PCA.

[35] "Bylaws of the NG9-1-1 Interoperability Oversight Commission." Article 5: Powers, NG9-1-1 Interoperability Oversight Commission. https://ng911ioc.org/library/

Responsibilities of the PCA include:

- Establishing shared "root of trust" specific to NG911
- Overseeing and enabling an NG911 entity to initiate communications with another NG911 entity using a certificate that identifies it as a verified 911 entity when establishing a connection
- Promoting interoperability by enabling the establishment of a secure connection with another entity in the NG911 ecosystem using its credentials that identify it as a known and validated 911 entity
- Permitting secure connection to be established with special privileges provided only to 911 entities that share root trust credentials
- Producing regular reports of NG911 implementation deployments

On May 5, 2020, NENA publicly announced that it had approved a contract award to the PCA administrator.

### 9.3.3. Fiscal Considerations

The i3 standard requires that credentials throughout the NG911 ecosystem be traceable to the NG911 PCA. The NG911 PCA shall be operated as a CA, and will require funding, as all CAs do, to sustain its operation. The cost associated with the operation of the CA will be assessed on entities that wish to establish a position on the chain of trust for NG911. This is normal practice in cybersecurity; any web service operator pays a fee to purchase a security certificate from a root CA provider in the chain of trust, in this case the NG911 PCA. This means the NG911 PCA does not necessarily impose a new cost on NG911 providers, because these providers would otherwise incur cost in acquiring or generating certificates. The NIOC's bylaws require the PCA to be operated with a public ledger and for all operations to be revenue neutral.[36]

#### *Considerations and Best Practices*

- All solutions implemented by PSAPs and 911 authority jurisdictions will need to be credentialed through the PCA to be certified as NG911-compliant.
- PSAPs and 911 authority jurisdictions should work with their vendors to ensure credentialing and standards compliance.
- PSAPs and 911 authority jurisdictions may want to consider credentialing requirements as part of their RFPs, contracts, and service level agreements (SLAs).

[36] Ibid., Article 2: Background, Section 1: Root of Trust.

### *Key Focus Points*

- Best practices in transactions via IP, even internal to networks, require transport layer security (TLS) negotiated with X.509 certificates.
- NG911 standards (i3) require that the PCA be operated to establish a chain of trust for NG911.
- The establishment of the PCA and its duties promotes interoperability by enabling the establishment of a secure connection with another entity in the NG911 ecosystem using its credentials that identify it as a known and validated 911 entity.
- NENA is not permitted to profit from its relationship with the NIOC or the PCA.

### *Support References and Recommended Reading*


- National Emergency Number Association. https://www.nena.org/page/AboutNENA
- *NENA Welcomes Establishment of NG9-1-1 Interoperability Oversight Commission*. https://www.nena.org/news/news.asp?id=488043
- Brothers, Chad, PMP, ENP and Sehnert, Dave, ENP. "A Key To Unlocking Enhanced Cybersecurity." *The Call,* Issue 35, 2020. National Emergency Number Association. https://www.thecall-digital.com/nenq/0120_issue_35/MobilePagedArticle.action?articleId=1584652#articleId1584652
- NIOC Leadership. https://ng911ioc.org/leadership

# 10. Forest Guide 101

## 10.1. Background

An FG, so named because it is like a tree, or rather many trees that are linked together in an integrated forest, of like systems that directs 911 call routing is a necessary component[37] of the NENA i3 standard and required for all NG911 systems to function and route calls properly.

In NG911, emergency call routing is managed by rules and in normal cases determined by the geospatial location of the caller. This is called Location-to-Service Translation (LoST)[38]. The FG is a LoST server that contains routing information for NG911 systems.

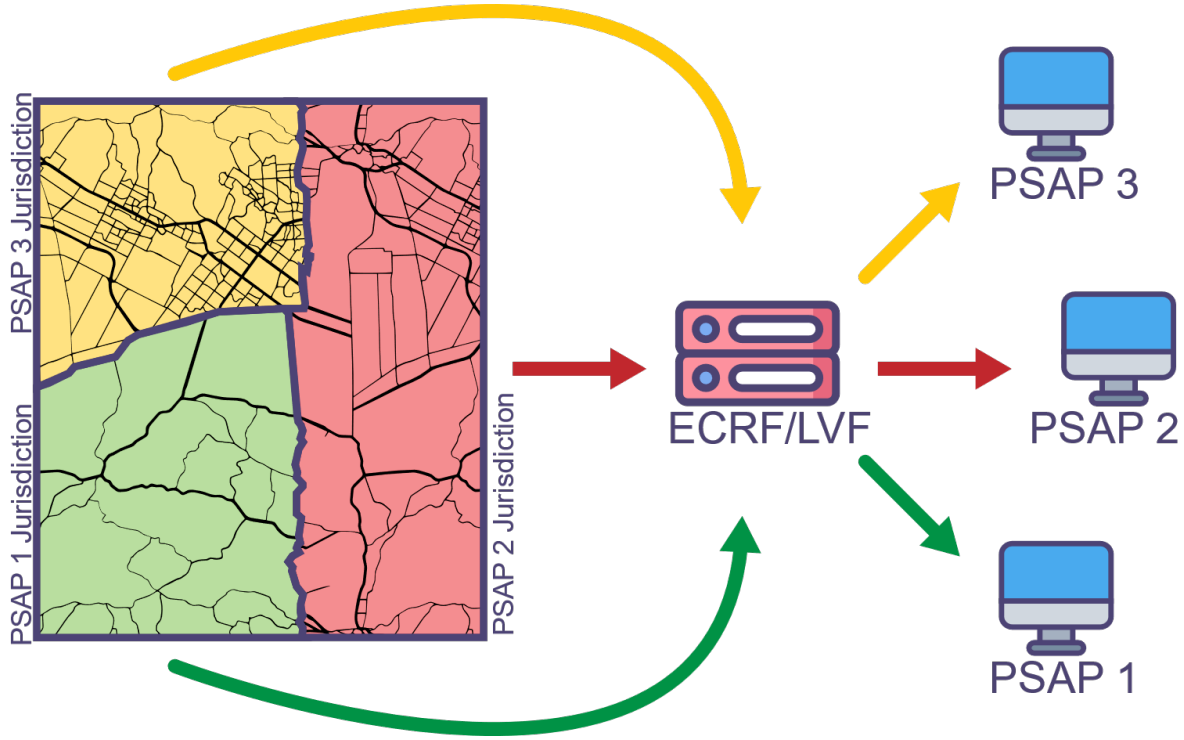


**Figure 17: LoST Routing Example**

[37] "Requirements for a National Forest Guide Information Document." NENA-INF-009.1-2014, National Emergency Number Association. https://www.nena.org/page/NatlForestGuide.

[38] LoST is Implemented in i3 and routes emergengy calls based on location of callers to PSAP service area mappings.

NENA's i3 standard describes an FG that contains routing information for every NG911 system in the U.S., as well as routing information for other FGs, such as a Canada or other non-U.S. entities. The FG is an implementation of IETF Request for Comment (RFC) 5582.[39]

The FG does not contain routing information for individual answering points. However, it will provide information for queries to find the correct LoST server that finds the answering point that serves that location; for example, a U.S. FG could provide routing information for each state-level ECRF.

The FG is continually queried. In NG911, this occurs when a request to the ECRF/LVF lacks the necessary information for a given location to determine its service area. The ECRF/LVF then queries the FG to determine whether it can identify the appropriate ECRF/LVF for routing for the location calling 911.

NENA defines a hierarchy service response mechanism of a geographic coverage area of one or more ECRFs/LVFs as "trees;" [40] this concept is adapted from the IETF internet standards that NENA adopts for NG911. Information is organized hierarchically, in a tree, with tree nodes representing larger geographic areas sometimes pointing to several smaller jurisdictional areas called "child" nodes. A collection of ECRFs/LVFs servicing separate ESInets is called a forest. An FG keeps track of the combined geographic coverage of all the trees for a given service area.

[39] "Location-to-URL Mapping Architecture and Framework." RFC 5582. https://tools.ietf.org/html/rfc5582
[40] "NENA Detailed Functional and Interface Standards for the NENA i3 Solution." NENA-STA-010.2-2016, National Emergency Number Association. https://www.nena.org/page/i3_Stage3

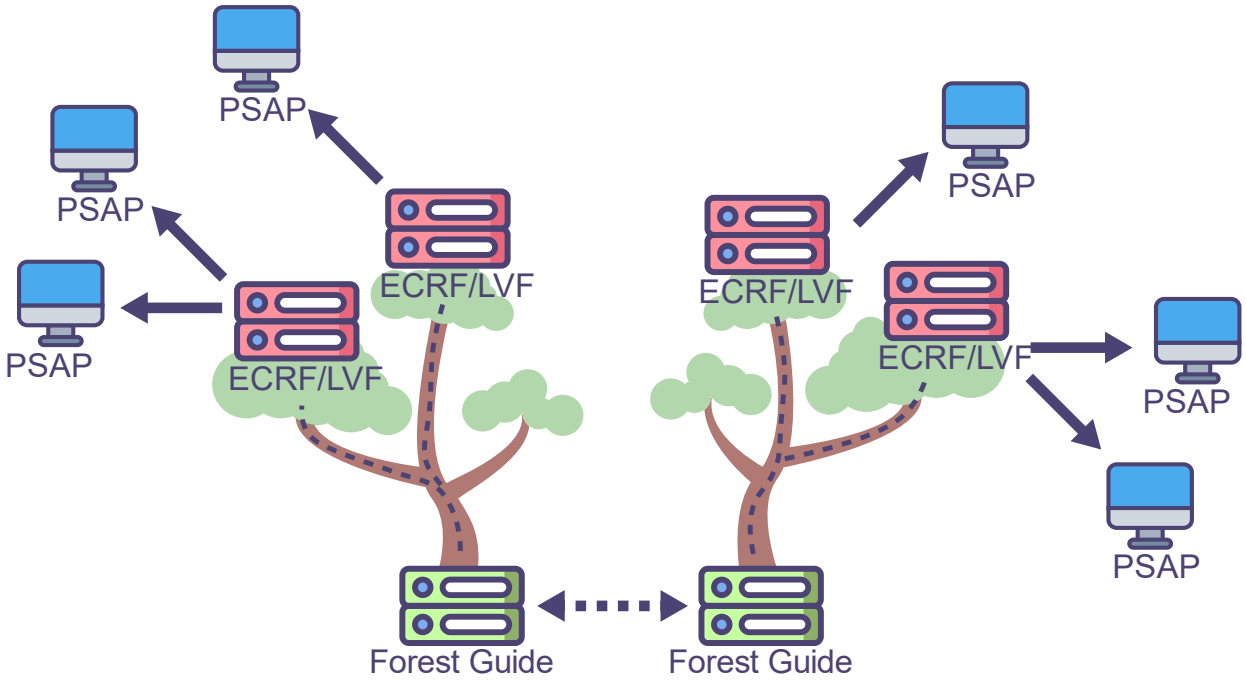


**Figure 18: FG Hierarchy Response**

The FG is not intended to be the initial routing directions for live emergency calls but is to be used for interoperability. In most cases, neighboring jurisdictions should provision routing information for each other, and queries will not normally be made of the authoritative FG. Each ESInet should also provision a local copy of FG information to increase resiliency of FG information within that ESInet. The FG provides for interoperability in cases where such prior coordination has not occurred; for example, jurisdictions geographically far apart or in neighboring countries or when the routing instructions are not intelligible to the system.

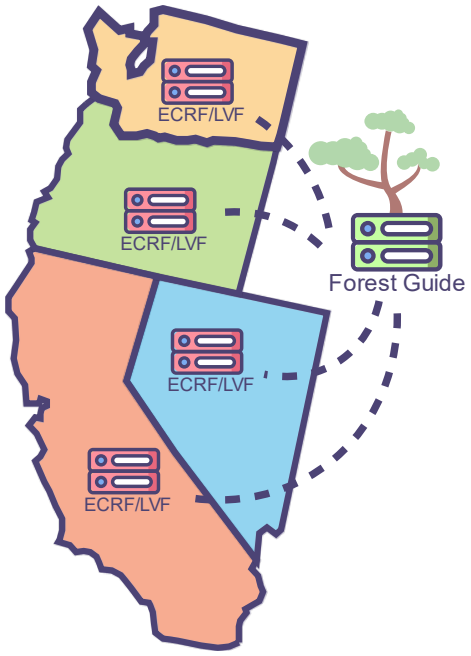


**Figure 19: Multiple States Provisioning to an FG**

A U.S. FG would include information about all the states' (trees) coverage area. It may also include border states coverage area information, such as a Canadian FG. When a location request happens within a state, and the tree cannot resolve the routing question, the FG will be asked by a node within the initial tree where it should be routed. The FG will then search its information for the appropriate "tree," which has the answer for the requested routing data. It is anticipated that in the end-state NG911 deployment, there will be approximately one tree per state at a minimum. Regionalization may require more than one tree per state. Also, transitional timing may drive the need for more than one tree per state.

Because the FG is the technology that enables the discovery of location validation and call routing data, a state, region, or other jurisdictional area that operates without a functional and reliable FG will be an "island." This situation will be worsened during transition since the ECRF "island" may be much more regional than at the state level. This could mean, for example, that a county cannot transfer a call to its neighboring county since they might be covered by different ECRFs that are not nodes on the same tree.

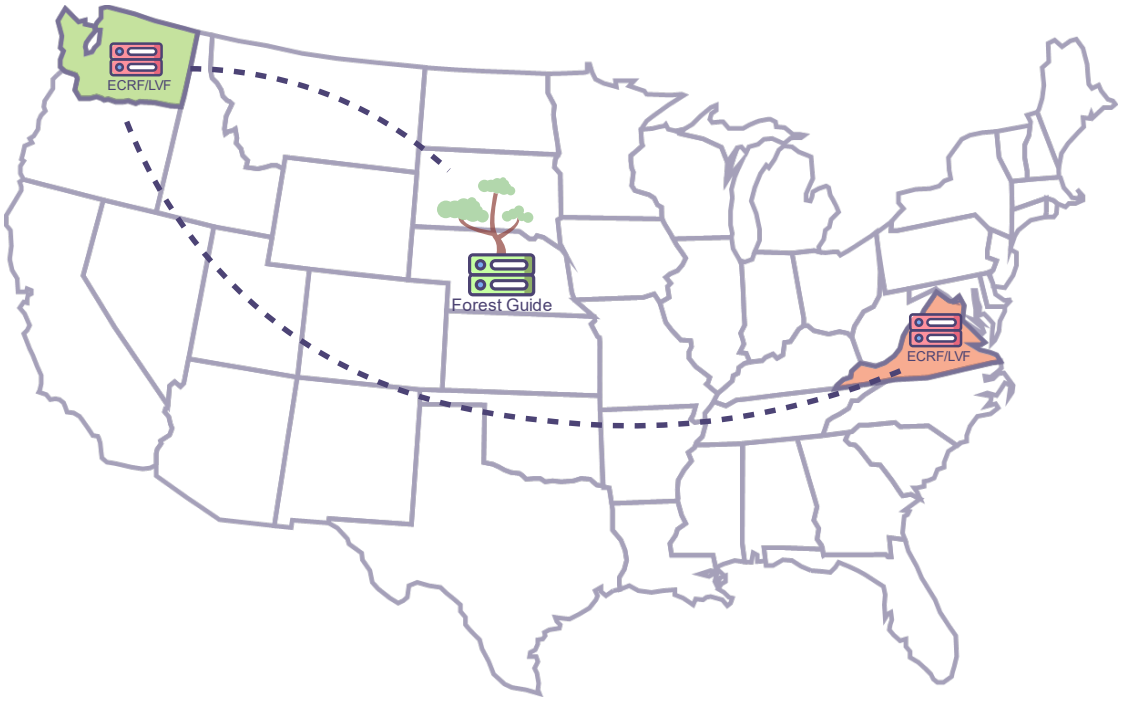


**Figure 20: Call Transfer Depiction Across the US (Using FG Routing) (Source: NENA)**

Once the FG is in place and functioning, it will have an impact on other functional elements in an NG911 system. Additionally, it should be operated with public and private 911 industry oversight and governance. It will be essential for the entity responsible for the FG to provide technical oversight and support. This may include dictating where the FG(s) need to be located, who will need to have access to it, notification procedures of errors, breaks in protocol, backup or service disruption requirements, etc. Finally, ESInet operators should provision local copies of routing information from the authoritative FG, so that there is no dependency on a third-party service to the local ESInet.

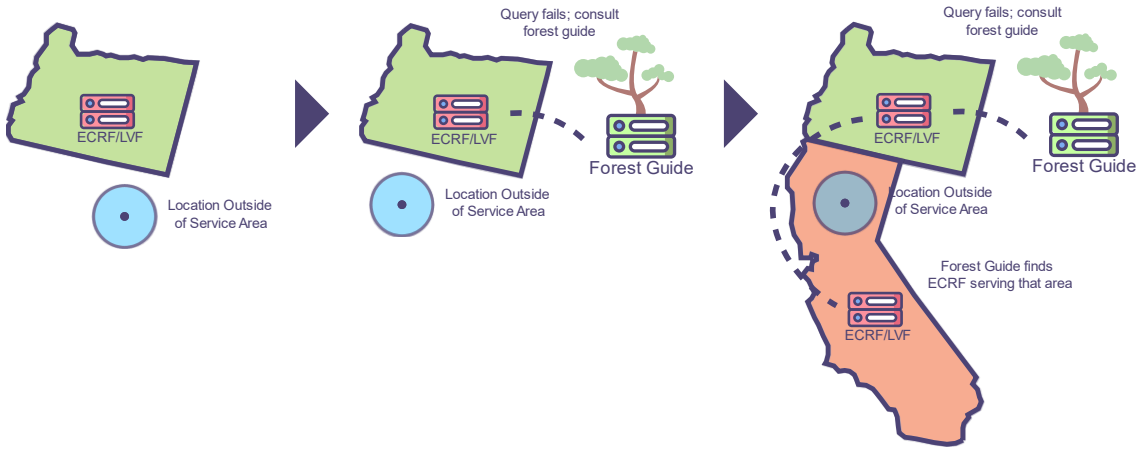


**Figure 21: Recursive Routing using an FG**

## 10.2. Roles and Responsibilities

### 10.2.1. Forest Guide Sponsoring Entity

The organization(s) that provides oversight and financing for a national FG[41] is known as the Forest Guide Sponsoring Entity (FGSE). NIOC has been convened and intends to operate an authoritative FG for the U.S. The trees under this national FG are considered "children," which might represent an entire state or a collection of routing functions within the state for each tree. The FG shall form the top level of the hierarchy, with one or more trees providing a hierarchical resolution service for different geographic regions that are part of the FG. The FG knows the geographic coverage region of all the trees and will direct queries to the node at the top of the appropriate tree.

#### *Trees*

Trees are an authoritative ECRF or a collection of ECRFs that support (and are supported by) the national FG.

#### *Children*

Children of the official FG are considered trees, which are represented by either a single statewide ECRF or a collection of ECRFs within a state for each tree.

### 10.2.2. Forest Guide Operator

The FG Operator (FGO) is the organization selected by the FGSE to establish and operate a national FG.

[41] In order to support navigation between trees, a national FG is necessary. The FG offers a LoST-sync interface to automate this process.

The FG will require operational oversight in order to be successful; at the time of this writing, NIOC is intended to provide that oversight. There are a few specific responsibilities that will belong to the FGO. For example, the FGO will be expected to provide 24x7x365 support and should be expected to deploy the FG functional element in a geo-diverse manner so that there is no single point of failure. i3 recommends that ESInet providers provision a local copy of the FG's authoritative routing information so that they do not depend on a third-party service, regardless of that third-party service's availability.

The FGO will also be expected to track errors and provide timely error reports to the FGSE and all contributing tree nodes. As a part of this responsibility, the FGO will need to establish an appeal process for the trees that have gaps and overlaps that have not been resolved by mutual agreement among the affected parties.

The national FGO will maintain contact information so that other national FGs can arrange to exchange their coverage regions and mappings.[42]

### 10.2.3. State's Role

State-level or equivalent ECRFs need to provision routing information for their ECRFs to an FG, so that other ECRFs can find them. In i3, an FG maintains internal and external interfaces; the internal interface is mission-critical and is only available to the ECRFs or FGs that have provisioned routing information to it, and allows those entities to find each other. By restricting queries to the internal FG interface to only those parties that are a member of the FG's ESInet, it is afforded an extra degree of protection from attacks. The external interface is available to anyone, such as service providers, to use for NG911 network discovery. However, that interface is not envisioned in i3 to be mission critical.

### 10.2.4. NG911 Service Provider Role

The role of the NG911 service provider is to ensure they have a system capable and configured appropriately to query for information and updates to information. Where a service provider operates an ECRF, it must provision routing information with an FG and should maintain a local replica of authoritative FG information.

## 10.3. Monitoring Responsibilities

The FGO will provide 24-hour support and establish a process to track trouble reports and record level of severity of the trouble on the impact to operations. SLAs should specify anticipated response timeframes for different levels of service issues. The FGO will be expected to report monthly to the FGSE on trouble reported in the system. An SLA should be written to require that the FGO should notify the

[42] "NENA Detailed Functional and Interface Standards for the NENA i3 Solution." NENA-STA-010.2-2016, National Emergency Number Association. https://www.nena.org/page/i3_Stage3

FGSE within 24 hours of any trouble considered to have major impact to operations or within two hours if the service availability SLA is violated.

The FGO may establish an appeal process for trees with gaps and overlaps that are not resolved by mutual agreement among the affected parties.

## 10.4. Timeline

Because each state and 911 authority are moving toward NG911 migration at their own pace, the schedule for provisioning with a production FG is difficult to predict. It is expected that the current trend of regional deployments will continue into the foreseeable future. Without national funding incentives to accomplish the migration in a more coordinated manner, a piecemeal approach has created pockets of migration at a state or regional level. Unfortunately, these regions may not be at the state level and, therefore, this will result in more than the estimated 50 contributing routing nodes. However, NIOC intends to provision a production FG by the end of 2020.

The adoption of location validation and call routing technologies will be hindered and progress on NG911 success slowed if there are overly complicated routing requirements, databases, and conflicting routing instructions.

### *Considerations and Best Practices*

- As part of the RFP process, potential service providers need to be questioned during the due diligence hearing process about their understanding, commitment, and obligations to the FGO and FGSE.
- The desire is that there will be a least 50 trees representing states in the U.S. FG. During transition there may be many more as NG911 is deployed in regional clusters that do not cover an entire state.
- "During transition to NG9-1-1, the FG shall be capable of supporting geographies that are not NG9-1-1 ready. If the FG determines that the location queried is in an area that is not represented in the FG (as opposed to a location that is not valid but within a known coverage area), it will return error condition of 'NG9-1-1 Service not implemented.' To facilitate the recognition of these 'uncovered' areas, the FG shall establish a transitional root node ECRF that contains all the uncovered areas for the FG's footprint."[43]
- The FG may reject an update to a tree coverage area until errors are resolved. Until the issue is resolved, any previously provisioned coverage area will remain in effect.

[43] NENA-INF-009.1-2014, *Requirements for a National Forest Guide Information Document*, National Emergency Number Association. https://www.nena.org/page/NatlForestGuide.

### *Key Focus Points*

- This is complicated as no one has gone down this road in North America before so there will be a learning curve. However, there are lessons learned from the European CELESTE project[44], which demonstrates a provisioned and tested FG for parts of western Europe, that may be instructive.
- The FG's usefulness and accuracy are dependent on standardized processes and adherence to requirements.
- There are various roles for providers and states to play. Everyone has a part to make it all work.

### *Support References and Recommended Reading*

- NENA-INF-009.1-2014, *Requirements for a National Forest Guide Information Document.* https://www.nena.org/page/NatlForestGuide
- RFC 5582, *Location-to-URL Mapping Architecture and Framework.* https://tools.ietf.org/html/rfc5582
- NENA-STA-010.2-2016, *NENA Detailed Functional and Interface Standards for the NENA i3 Solution*. https://www.nena.org/page/i3_Stage3 https://www.nena.org/page/i3_Stage3
- NIOC, Leadership. https://ng911ioc.org/leadership/

To better understand the technical characteristics of an FG, the reader is directed to the following documents:

- RFC 5222, *LoST: A Location-to-Service Translation Protocol*. https://tools.ietf.org/html/rfc5222
- RFC 5582, *Location-to-URL Mapping Architecture and Framework*. https://tools.ietf.org/html/rfc5582
- RFC 6739, *Synchronizing Service Boundaries and <mapping> Elements Based on the Location-to-Service Translation (LoST) Protocol*, pages 9 and 15. https://tools.ietf.org/html/rfc6739

[44] CELESTE, European Emergency Number Association. https://eena.org/?s=CELESTE

# 11. Collaboration and Coordination between Federal and Military Stakeholders

Maintaining service parity between state or local 911 programs and the military facilities within their borders is more critical in the NG911 environment than it has been previously in the legacy environment. Military installations that do not migrate to NG911 along with their local area counterparts will become islands unable to share emergency information with public safety partners in the communities in which they reside. Lack of integration will result in greater risk to life and property and degraded capabilities to fulfill obligations under normal response conditions and mutual-aid agreements.


**Figure 22: Military Branches**

As local/state jurisdictions migrate to NG911 and transition away from legacy equipment, military installations may lose 911 service unless they coordinate efforts with local/state 911 agencies, or until DOD assumes the cost of operating the old legacy system if that is available to them.

Military legacy 911 systems risk being left behind if they don't adapt rapidly while their local government 911 counterparts, manufacturers, vendors, and commercial carriers transition to IP. As legacy 911 infrastructure continues to age, replacement equipment becomes more difficult to find, more expensive to replace or repair, and more likely to cause downtime of indispensable 911 service. The result will be an ineffective communications system and less-than-optimal response to emergency calls for help on the DOD base facility, or as local responder personnel are called to respond to requests for mutual aid.

State and local authorities are encouraged to work closely with the federal and military installations that are adjacent to or part of their jurisdiction. Review or implement mutual-aid agreements with federal partners to enhance collaboration. To be inclusive, invite federal partners to be part of your planning

processes, which will serve to educate them and keep them informed about the impacts of changes at the local level so they can make decisions about their next steps.

There are multiple benefits to engaging military stakeholders in your planning process as well as consequences of an uncoordinated transition to NG911. These benefits should be considered and shared with federal partners to encourage further integration and interoperation between federal systems and state or local 911 networks. Please use the prepared benefits and consequences found in Appendix H to enhance and support your discussion with DOD base commanders and their 911 communication personnel.

### *Considerations and Best Practices*

- Engage DOD in planning and NG911 transition efforts and encourage their participation in facilitating upgrades to military networks to align with state and local 911 migration.
- Share benefits and consequences tools to clarify the advantages for the DOD as well as inform of consequences if no action is taken.
- Provide support and assistance, as required, to accomplish interoperability for state/local 911 jurisdictions and DOD facilities within state borders.

### *Key Focus Points*

- Degradation in service will leave the DOD facility a communication island and hamper effective emergency response.
- Improved operations and improved response can be realized by greater interoperability with state and local NG911 systems.
- Interoperability with state and local NG911 networks and systems will improve service delivery and ensure a more resilient and reliable emergency communications system.

### *Support References and Recommended Reading*


- Chan, Serena and Hernon, Michael T., *Department of the Army: Closing the Next Generation 9-1-1 Capability Gap*, May 2019, Institute for Defense Analyses. https://www.ida.org/research-and-publications/publications/all/d/da/department-of-the-army_closing-the-next-generation-9-1-1-capability-gap
- National 911 Program, *DoD's PSAP Pilot Project Aims to Improve Communication During Military Incidents*. https://www.911.gov/911connects/issue-4/DoDs-PSAP-Pilot-Project-Aims-to-Improve-Communication-During-Military-Incidents.html
- Department of Defense, *DoD Digital Modernization Strategy*, July 12, 2019. https://media.defense.gov/2019/Jul/12/2002156622/-1/-1/1/DOD-DIGITAL-MODERNIZATION-STRATEGY-2019.PDF
- Chan, Serena and Hernon, Michael T., *Military and Civilian Collaborations in Deploying Next-Generation 9-1-1,* July 2019, Institute for Defense Analyses. https://www.ida.org/research-and-publications/publications/all/m/mi/military-and-civilian-collaborations-in-deploying-next-generation-9-1-1

# ACRONYMS

| Acronyms | |
|---|---|
| ALI | Automatic Location Identification |
| ANI | Automatic Number Identification |
| BCF | Border Control Function |
| CA | Certificate Authority |
| CAMA | Centralized Automated Message Accounting |
| CHE | Call-Handling Equipment |
| CI | Critical Infrastructure |
| CLC | Call Logic Center |
| CLEC | Competitive Local Exchange Carrier |
| CO | Central Office |
| CPE | Customer Premise Equipment |
| DBMS | Database Management System |
| DNS | Domain Name System |
| DOD | Department of Defense |
| E911 | Enhanced 911 |
| ECC | Emergency Communications Center (i.e., PSAP) |
| ECRF | Emergency Call Routing Function |
| EFD | Emergency Fire Dispatch |
| EMD | Emergency Medical Dispatch |
| EMS | Emergency Medical Services |
| EPD | Emergency Police Dispatch |
| ESN | Emergency Services Number |
| ESInet | Emergency Services IP Network |
| ESQK | Emergency Services Query Key |
| ESRK | Emergency Services Routing Key |
| ESRP | Emergency Services Routing Proxy |
| ESRQ | Emergency Services Routing Query |
| ESZ | Emergency Service Zone |
| FCC | Federal Communications Commission |

| Acronyms | |
|---|---|
| FG | Forest Guide |
| FGO | Forest Guide Operator |
| FGSE | Forest Guide Sponsoring Entity |
| GIS | Geographic Information System |
| HELD | HTTP-Enabled Location delivery |
| HSEMD | Department of Homeland Security and Emergency Management |
| HTTP | Hypertext Transfer Protocol |
| IA | Interstate Agreement (see also ICA) |
| ICA | Interstate Cooperative Agreement |
| ICN | Iowa Communications Network |
| IETF | Internet Engineering Task Force |
| ILEC | Incumbent Local Exchange Carrier |
| IP | Internet Protocol |
| IPSR | Internet Protocol Selective Router |
| IT | Information Technology |
| ITT | Inter-Tandem Trunk |
| LATA | Local Access and Transport Area |
| LDB | Location Database |
| LEC | Local Exchange Carrier |
| LIS | Location Information Server |
| LNG | Legacy Network Gateway |
| LOA | Letter of Agency |
| LoST | Location-to-Service Translation |
| LPG | Legacy PSAP Gateway |
| LSR | Label Switching Router |
| LSRG | Legacy Selective Router Gateway |
| LVF | Location Validation Function |
| MCS | MSAG Conversion Service |
| MITM | Man-in-the-Middle |
| MMA | Minnesota Materials Management Agency |

| Acronyms | |
|---|---|
| MOA | Memorandum of Agreement |
| MOP | Methods of Procedure |
| MOU | Memorandum of Understanding |
| MPLS | Multi-Protocol Label Switching Architecture |
| MSAG | Master Street Address Guide |
| MSC | Mobile Switching Center |
| NASNA | National Association for State Nine-One-One Administrators |
| NCSWIC | National Council of Statewide Interoperability Coordinators |
| NDA | Non-Disclosure Agreement |
| NENA | National Emergency Number Association |
| NG911 | Next Generation 911 |
| NGCS | Next Generation Core Services |
| NDA | Non-Disclosure Agreement |
| NIOC | NG9-1-1 Interoperability Oversight Commission |
| OSE | Originating Service Entity |
| OSP | Originating Service Provider |
| pANI | Pseudo Automatic Number Identification |
| PCA | PSAP Credentialing Agency |
| PIDF-LO | Presence Information Data Format – Location Object |
| PKI | Public Key Infrastructure |
| POC | Point of Contact |
| POI | Point of Interconnection |
| POP | Point of Presence |
| PPOC | Primary Point of Contact |
| PRF | Policy Routing Function |
| PSAP | Public Safety Answering Point |
| PSC | Public Service Commission |
| PUC | Public Utilities Commission |
| QoS | Quality of Service |
| RFC | Request for Comment |

| Acronyms | |
|---|---|
| RFP | Request for Proposal |
| SHAKEN | Signature-based Handling of Asserted Information Using toKENs |
| SIP | Session Initiated Protocol |
| SLA | Service Level Agreements |
| SOI | Service Order Input |
| SR | Selective Router |
| SS7 | Signaling System 7 |
| SSP | System Service Provider |
| STIR | Secure Telephone Identify Revisited |
| TDM | Time-division multiplexing |
| Telcos | Telephone Companies |
| TFOPA | Task Force on Optimal Public Safety Answering Point Architecture |
| TN | Telephone Number |
| URI | Uniform Resource Identifier |
| URN | Universal Routing Number |
| USDOT | United States Department of Transportation |
| VoIP | Voice over Internet Protocol |
| VPN | Virtual Private Network |

## APPENDIX A – SELECTIVE ROUTER TRANSITION ESTIMATES

| State | Actual | 2021 | 2023 | 2025 | 2027 | 2029 | After 2030 | None Known | Unknown | Complete |
|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | 2021 | x | | | | | | | | |
| Alaska | 2030 | | | | | | x | | | |
| Arizona | 2025 | | | x | | | | | | |
| Arkansas | 2025 | | | x | | | | | | |
| California | 2022 | | x | | | | | | | |
| Colorado | none | | | | | | | x | | |
| Connecticut | 2023 | | x | | | | | | | |
| Delaware | none | | | | | | | x | | |
| District of Columbia | 2021 | x | | | | | | | | |
| Florida | 2027 | | | | x | | | | | |
| Georgia | 2025 | | | x | | | | | | |
| Hawaii | 2027 | | | | x | | | | | |
| Idaho | 2030 | | | | | | x | | | |
| Illinois | 2025 | | | x | | | | | | |
| Indiana | 2021 | x | | | | | | | | |
| Iowa | 2030 | | | | | | x | | | |
| Kansas | none | | | | | | | x | | |
| Kentucky | 2025 | | | x | | | | | | |
| Louisiana | 2035 | | | | | | x | | | |
| Maine | none | | | | | | | x | | |
| Maryland | 2022 | | x | | | | | | | |
| Massachusetts | 2018 | | | | | | | | | x |
| Michigan | 2024 | | | x | | | | | | |
| Minnesota | none | | | | | | | x | | |
| Mississippi | | | | | | | | | x | |

| State | Actual | 2021 | 2023 | 2025 | 2027 | 2029 | After 2030 | None Known | Unknown | Complete |
|---|---|---|---|---|---|---|---|---|---|---|
| Missouri | 2027 | | | | x | | | | | |
| Montana | 2030 | | | | | | x | | | |
| Nebraska | 2024 | | | x | | | | | | |
| Nevada | | | | | | | | | | |
| New Hampshire | none | | | | | | | x | | |
| New Jersey | 2023 | | x | | | | | | | |
| New Mexico | 2030 | | | | | | x | | | |
| New York | none | | | | | | | x | | |
| North Carolina | none | | | | | | | x | | |
| North Dakota | 2027 | | | | x | | | | | |
| Ohio | none | | | | | | | x | | |
| Oklahoma | 2023 | | x | | | | | | | |
| Oregon | 2027 | | | | x | | | | | |
| Pennsylvania | 2023 | | x | | | | | | | |
| Rhode Island | 2022 | | x | | | | | | | |
| South Carolina | 2030 | | | | | | x | | | |
| South Dakota | 2030 | | | | | | x | | | |
| Tennessee | 2023 | | x | | | | | | | |
| Texas | 2023 | | x | | | | | | | |
| Utah | 2021 | x | | | | | | | | |
| Vermont | 2007 | | | | | | | | | x |
| Virginia | | | | | | | | | | |
| Washington | 2014 | | | | | | | | | x |
| West Virginia | none | | | | | | | x | | |
| Wisconsin | none | | | | | | | x | | |
| Wyoming | 2030 | | | | | | x | | | |

# APPENDIX B – LETTERS OF AGENCY

Three sample LOAs can be found on the pages that follow. The LOAs are designed to be used for:

- Authorization to Access Telephone Provider Records
- ANI/ALI Carrier Notification of Change in 911 Services
- Authorization to Access Telephone Provider Records – Delegated Authority

STATE or AGENCY LETTERHEAD

DATE

Letter of Agency – Authorization to Access Telephone Provider Records

By signing this letter below, I authorize <***NAME OF CORPORATION (Common Name)***> to (a) access any and all customer service records, account information, ESNs, contracts, long distance carrier information, pending order activity and/or any other information relevant to local or long distance telecommunications service (voice or data), and (b) to establish electronic or online access to any billing for such service, if not already established, or if already established, to be provided login information for such electronic or online access. At ***<Common Name of Corporation>***'s request, I authorize the provider to transmit customer service records and any requested documentation to the ***<Common Name of Corporation>*** Delegated Authority listed below.

Per House File 2254 of 87th General Assembly, I represent that I have authority to execute this form and grant this permission and I hereby desire for ***<Common Name of Corporation>*** to be added as an authorized point of contact (POC) for these accounts. This permission shall remain in effect until I affirmatively revoke it. If I withdraw the authorization set forth in this letter, I will notify Provider immediately in writing.

**Client Contact Information**
Name
Title
Title/Agency name
Official mailing address
Contact telephone number
Contact email address

**Provider Contact Information**
Delegated Authority Name
Company name
Official mailing address
Provider contact telephone number
Provider contact email address

Authorized signature:
Date: MM/DD/YYYY

If you have any questions, please feel free to contact me at **xxx-xxx-xxx** or via email at xxxx@xxxx.xxx.

Sincerely,
Name

Title

STATE or AGENCY LETTERHEAD

DATE

Letter of Agency – ANI/ALI Carrier Notification of Change in 911 Services

Pursuant to this integrated Letter of Agency and Carrier Notification ("LOA"), the ***<State or Local Jurisdiction Name>*** (the "***Department or other abbreviated name***"), with a principal place of business at <***State or Local Jurisdiction official location address***>, for itself, on behalf of the State of ***<State Name>***, and as agent for the 911 authority responsible for 911 services in each county of the State of ***<State Name>*** (collectively, the "State"), has retained ***<New Provider Name>*** (the "Vendor") , wholly-owned subsidiaries of ***<Corp. Name if applicable>***, to act on its limited agent and on its behalf, through specifically identified individuals, their designees, or through the duly authorized third-party agents of the Vendor, for purposes of providing the State with the 911 database management, (including but limited to NG911 services) and related services ("NG911 services"), managing the migration of the Automatic Location Identification (ALI) 911 services currently provided to the State to the NG911 services platform and network(s) managed by the Vendor and for the purposes enumerated herein.

1. This Letter of Agency (LOA) is effective on the date shown above and will remain in force until revoked in writing.

2. The establishment of the new ALI and NG911 services platform is underway. More information will be provided soon. Beginning on MM/DD/YYYY, all 911 database information will be dual provisioned in the Department's ALI s database management system (DBMS) provided by the Vendor.

3. For questions regarding this LOA, or the requests below, please contact:

   Name:
   Title:
   Email:
   Phone:

   The State hereby authorizes the Vendor to discuss, arrange, and coordinate DBMS services for and in support of the provision of the ALI and NG911 services.

4. The State hereby authorizes the Vendor to request, as needed, the following from your company [including, but not limited to, Incumbent Local Exchange Carriers, Competitive Local Exchange Carriers, Incumbent 911 ALI Service Providers ("ALI(s)" or "SALI(s)"), VoIP Service Providers, Companies using Private Switch PS-ALI Services, other 911 or NG911 Service providers, other PSAPs, other 911 Authorities, and Telephone Service Providers ("TSP(s)") providing services in the territory of or connected to the State:

a. Service Order Input (SOI) information (including, but not limited to, data formats, transfer mediums, subscriber address information, etc.) for all subscribers within the emergency serving area;

b. Where applicable for a), above, for dynamic solution utilizing pANIs, provide the ESRK/ESRD/ESQK, all pANI records and related ALI steering tables;

c. All relevant Points of Interconnection;

d. All relevant Telephone Subscriber Information available by law or regulation to the 911 Authority; and

e. Daily telephone company service order update activity, used for the State and its PSAPs, responding to requests for emergency services from your subscribers and any other information associated with and/or supporting telephone number and selective routing data.

5. If you have a third-party provider for data submission to ALI service providers; please forward this notification to that third party.

6. Any proprietary or confidential data acquired hereunder will be used solely for the purposes of providing the ALI and NG911 services described above and will be protected from unauthorized use or disclosure pursuant to **[add state statue on holding data confidential, if no state statue adjust content]**.

7. Please place the term "CONFIDENTIAL" on the cover of any document containing proprietary information and clearly and specifically mark all proprietary information contained within the document.

Thank you for your cooperation with this very important project. If you have any questions, please feel free to contact me at **xxx-xxx-xxx** or via email at xxxx@xxxx.xxx.

The undersigned represents that they have authority on behalf of the State to authorize this LOA.

Sincerely,

Signature

Printed Name

Title

STATE or AGENCY LETTERHEAD

DATE

Letter of Agency – Authorization to Access Telephone Provider Records

By signing this letter below, I authorize ***<Delegated Authority>*** to (a) access any and all customer service records, account information, ESNs, contracts, long distance carrier information, pending order activity and/or any other information relevant to local or long distance telecommunications service (voice or data), and (b) to establish electronic or online access to any billing for such service, if not already established, or if already established, to be provided login information for such electronic or online access. At ***<Delegated Authority>****'s* request, I authorize the provider to transmit customer service records and any requested documentation to ***<Delegated Authority Name>***, listed as the Delegated Authority below.

Per ***<legal identified authorization such as statute or regulation)***, I represent that I have authority to execute this form and grant this permission and I hereby desire for ***<Delegated Authority Name>*** to be added as an authorized point of contact (POC) for these accounts. This permission shall remain in effect until I affirmatively revoke it. If I withdraw the authorization set forth in this letter, I will notify provider immediately in writing.

Client Information
***<State or Local Jurisdiction Name>***

Provider Information
***<Company Name>***

Delegated Authority
***<Delegated Authority Name>***
***<Delegated Authority Title>***
***<Delegated Authority Telephone Contact>***
***<Delegated Authority Email Contact>***

Authorized signature:
Printed Name:
Title:
Date: MM/DD/YYYY

If you have any questions, please feel free to contact me at **xxx-xxx-xxxx** or via email at xxxx@xxxx.xxx.

# APPENDIX C – OPTIMUM NG911 ARCHITECTURE DECISION PROCESS

For every state, region, or individual 911 jurisdiction, decisions based on the needs of the community, available funding, technology capabilities, and operational requirements will have to be considered, discussed, and determined. Most often, best practices in the decision-making models followed by the 911 community include active engagement by appropriate stakeholders impacted by the outcomes of those decisions. Generally, decisions fall into four primary categories: governance, technology, operations, and funding.

The table below captures the significant areas of decision points followed by the Interstate Playbook states.

**Table C-1: Decision Points**

| Area of Impact | Decision Points |
|---|---|
| **Governance Impacts** | • Is strategic plan sound?<br>• Have stakeholders been actively engaged in the planning process<br>• Statutes and rules have been amended to incorporate NG911 technology elements in a technology neutral way and appropriate authority at the governance level<br>• Statute revisions also are necessary to ensure technology neutral references<br>• MOUs/ICAs are executed |
| **Technical Impacts** | • Network solution vendor selection<br>  ○ What works best for local environment?<br>  ○ What vendor can supply most value?<br>  ○ Does the vendor have a positive record of accomplishment and experience in NG911 implementation?<br>  ○ Stakeholder involvement<br>  ▪ Have stakeholders been engaged in discussions?<br>  ▪ Is there buy in?<br>• Determine best practice technical solution with the vendor(s)<br>  ○ Ensure the solution has met all necessary requirements<br>  ○ Ensure the solution is compliant with standards and has an MOP that contains procedures for:<br>  ▪ The best practices for the solution<br>  ▪ Measurable testing<br>  ▪ Back-out procedures<br>  ▪ Conducting a hotwash or after-action review following every MOP execution that:<br>  • Reviews the event<br>  • Provides root cause analysis for any major process failure(s) |

| Area of Impact | Decision Points |
|---|---|
| | • Identifies lessons learned<br>• Describes corrective action options<br>▪ Network management function is defined and understood by the parties<br>• Migration process<br>○ Migration process is defined in the MOP<br>○ Provider facilities in place or ordered; can take as much as 60 days or more to procure<br>○ Interconnection agreements, one of the most significant and necessary pieces of the puzzle, between the solution vendor (NGCS) and the OSP are executed<br>▪ These are contractual agreements and will take significant time to craft and to obtain approvals<br>▪ Allow sufficient process time<br>▪ Data must be error free and these requirements should be included in the agreement<br>○ Roles and responsibilities have been discussed and clarified<br>○ Timeline is reasonable and consistent with contract requirements |
| **Operational Impacts** | • Routing decisions have been determined through an open and communicative process with appropriate stakeholders; this is a good time to reevaluate overflow and abandonment routing between the PSAP and its back up facility as well as default routing for no record found situations<br>• Staffing considerations have been discussed<br>• Training has been updated and conducted to accommodate new processes, technology, and actions required in NG911<br>• Operational protocols and policies have been updated and shared with the appropriate 911 jurisdictions with which the agency interoperates |
| **Financial Impacts** | • Cost elements are clarified<br>• Sustainable funding sources identified<br>• Contract documents are legally correct and approved by legal team for the jurisdiction<br>• Budgeting considerations<br>• Cost sharing or cost allocation has been discussed and agreed to (if applicable) |

### *Points of Interconnection*

Identify POIs or POPs where wireless, wireline, and VoIP carriers (e.g., service providers, OSPs) may connect to the ESInet.

- If possible, the solution should consider at least two POIs/POPs in each LATA for redundancy. The solution should require diverse network paths to the POIs.
- Best practice is to provide a network diagram with exact locations, which is provided by the solution provider, to carriers.

### *Notification Process*

Identify every wireline, wireless, or VoIP provider in the area that will deliver 911 calls to the ESInet.

- Notify providers of the intent to migrate from the legacy selective routers to which they currently connect and work with them to lay out a plan to move their traffic to the new network; this will need to be a collaboration and their participation is essential.
    - Find out about telco regulations and the provider's responsibility.
    - Talk to your public utility or public service entity to understand what the provider's responsibilities are and where those responsibilities end.
    - Clarify and explain to carriers/providers who is responsible for determining the POI or POP and who is responsible for getting traffic to the identified connecting point. Again, confer with the regulatory body in your state.
    - For each carrier, get a best- and worst-case estimate for them to migrate their traffic to the nearest POI/POP(s).
- Phase in PSAP transition over time to ensure all is working properly before transitioning the next PSAP or group of PSAPs.
    - Create a schedule to minimize the dual billing period, while providing sufficient time for "soaking" of the new connections before terminating old connections.
    - Ensure no 911 calls are being routed to the old circuits (legacy selective router) and understand what happens if any leak through occurs after old circuits are turned off.

### *Network Procurement*

Place orders for needed connections, per schedule**.** Ensure connections are large enough to support expected traffic levels and call volumes. Plan for testing before traffic is migrated to ensure calls can be routed through the new call routing solution, delivered to the correct PSAP, and answered (voice quality issues, delay in connections, etc.).

### *Routing Determinations*

Determine alternate routing for all PSAPs; discuss and document alternate routing rules for the Policy Routing Function (PRF).

- Where do calls go if a PSAP is offline (maintenance, large-scale outage, PSAP network not responding)?
- Where do calls go if a PSAP is busy? Where do calls overflow?
- Where do calls go if host site (CHE) is unreachable (e.g., to a PSAP on a different CHE host, back to OSP, default PSAP)?
- What is delivery PSAP-of-last-resort (all routes have failed)?
- Design, configure, and test alternate routing decisions.
- Other?

### *Other Operational Considerations*

Identify any "star codes," or abbreviated dialing codes[45] currently in use by any PSAPs for performing inter-tandem transfers on the existing selective router(s). Ensure duplicates are resolved or that new selective routers can handle duplicates by creating PSAP-specific star code/abbreviated dialing code tables by:

- Some PSAPs agree to use all new codes.
- PSAPs with duplicates agree to do away with star codes and leverage CHE capability for speed dials to dial the full number (or Uniform Resource Identifier [URI]) with the press of a single button (at least for all duplicate codes).
- Extend star code length and assign unique one- or two-digit PSAP prefix to each PSAP with duplicate codes to ensure each PSAPs codes are unique, but mostly the same.
- Configure new star codes/abbreviated dialing codes in the new selective router database and train PSAP administrative personnel how to update the star code database.

### *Inter-tandem Trunks*

Identify if old selective router(s) have inter-tandem trunks (ITTs), i.e., connections to other selective routers in the area.

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[45] Also known as URNs (Universal Routing Numbers), these become Uniform Resource Locators (URLs) in NG911, which can contain an address much like an email address or a ten-digit number. The codes are typically configured in the CHE and unique to each PSAP on that CHE (multitenancy).

- If other selective router is on the same ESInet, ITTs may be removed, eventually.
- If other selective router is not on the ESInet, will need to provide ESInet to legacy selective router gateway (LSRG) with sufficient capacity to match existing ITTs.
- If other SR is on a different ESInet, explore direct ESInet-to-ESInet connections, wherever possible.

### *Conferencing*

If the old selective router provided any conferencing capability (standard or custom), ensure the new selective router can replicate the same functionality and capacity. If not, ensure PSAPs are notified and accept change in operational functionality.

### *Location Services*

If deploying a new ALI solution, ensure all carriers are willing or able to deliver duplicate ALI updates (SOIs) to both old and new ALI systems during the transition. Some vendors will want to charge for this; some may refuse to do it. The old ALI system may need to forward updates to the new system for carriers that cannot or will not do so, directly. Consider cost implications for dual ALI systems and seek ways to minimize the amount of time these costs will be necessary.

Consider requesting ALI extracts from the legacy service provider(s) in conjunction with the request to carriers to provide updates to the new ALI/LIS (location information server).

# APPENDIX D – METHODS OF PROCEDURE

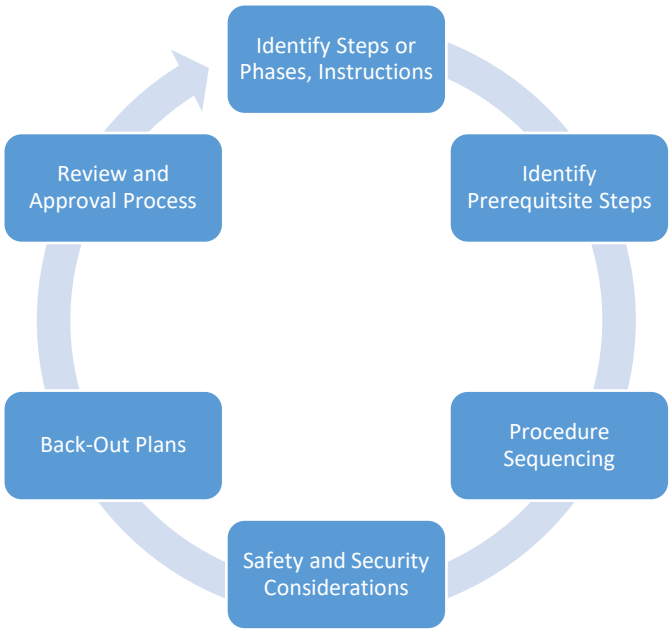
## MOP Components

MOPs may contain different elements, information, and details depending on the complexity of the activity to be carried out and the probability and impact of a failure in its execution. For instance, the field "expected result of the action" could be added to every step in the procedure.

In order to be effective, an MOP needs to be followed as described and agreed to without deviation.

MOPs should also include additional information, including prerequisites, safety requirements, special tools and parts, procedure sequencing, and a back-out plan.

- Prerequisites include any actions that must be completed prior to performing the procedure, including verifying that all appropriate approvals (e.g., change approval, access approval) have been obtained, any required notifications have been issued, and any required reconfiguration of the infrastructure has been performed.
- Safety requirements include lockout/tagout procedures and the verifications associated with them, and the required presence of safety representatives.




- Include any special tools, technology, hardware, or software needed.
- Interruptions to retrieve technology, software backup tools, or hardware replacement will usually extend the length of maintenance windows and increase risk to the solution's operations. Extensions of maintenance windows or deviations from the agreed upon maintenance schedule can lead to the maintenance window being aborted. Aborted changes can lead to deferred maintenance.

The most important parts of an MOP are the step-by-step instructions or procedures sequencing. Every step needs to be described in detail to indicate exactly what needs to be done and the expected result (e.g., alarms or indicator lights changing state, displays, location of call presentation).

### *Go/No-Go*

The Go/No-Go decision is an important consideration for a transition project that is predictive and where there are agreed upon incremental phases or stages.[46] It is a formal approach to verify the work identified in the MOP and then validate or confirm that it has been accomplished. This is a formal decision process of whether the project is going to go ahead or regroup or repeat actions. If there is any reason to pause, recheck, or to reverify, this would be a no-go decision. No-go is not an absolute, it's a transition point. You are checking with everybody involved in the project: "Is all the work correct? Is it ready? Do we all verify that we should be able to go forward to the next step?"

### *Back-out Plans*

Back-out plans are step-by-step instructions for returning a system to its initial state or other pre-defined stable and safe state from which it can be operated at a later stage. Back-out plans can be described as alternative action steps within the MOP after some verification step or Go/No-Go checkpoint. These alternative action steps must be taken in case the outcome of the verification does not conform to the expected condition or if the result of the checkpoint is a No-Go.

### *Review and Approval Process*

MOPs must be integrated into the change management system to ensure that they are properly reviewed and approved. The duration and depth of the change approval reviews will depend on the criticality or risk of the MOP. A risk assessment must be performed to determine if any of the actions or changes of state included in the procedure entail a high risk (high probability of occurrence of the problem or high impact if the problem happens). MOPs should be reviewed at least annually to ensure that they are up-to-date and relevant.

[46] Fullmer, Steve. "Go/No-Go Decisions in Business Analysis and Project Management," Interface, March 4, 2019. https://www.interfacett.com/blogs/go-no-go-decisions-in-business-analysis-and-project-management/

## Timeline

A timeline should be constructed that is a realistic assessment of the steps needed to migrate from the legacy selective router. The table below is a high-level migration plan, as experienced by our Playbook participant states.

**Table D-1: Legacy Selective Router Migration Sample Timeline**

| WBS | Legacy Selective Router Migration Project Plan | Duration |
|---|---|---|
| 1 | Circuit order writing and data collection | 30-60 Days |
| 2 | Circuit ordering and setup | 60-145 Days |
| 3 | Interoperability agreements with the carriers (if modification needed) | 30-180 Days |
| 4 | Circuit ordering process | 15-30 Days |
| 5 | Circuit installation and pre-production testing | 45-60 Days |
| 6 | Develop MOP for transitioning circuits into production | TBD |
| 7 | Pre-production call flow testing | 15 Days |
| 8 | Cut circuit into production | 1 Day |
| 9 | Conduct hotwash or after-action review | 1 Day |

These process steps and associated timeline is provided as an example only. Each state or regional implementation will need to have its own timeline and process steps defined.

# APPENDIX E – LAB-TO-LAB TESTING TEST CASE SCENARIO

**Scenario:**

Transfer the Telephone Number (TN)/Emergency Services Routing Key (ESRK)/Emergency Services Query Key (ESQK) over a secure IP VPN connection with ALI delivery (pre-i3 testing)

**Testing Preparation:**

The parties shall share an interface specification document that describes the ESInet capabilities and what the other ESInet provider shall expect regarding system performance and general system communications between networks.

In advance of testing, the teams will need to identify the data that needs to be provisioned in advance of testing (TN data; Sample ALI data for each organization).

**Draft Test Case:**

Preconditions:

- Establish secure IP VPN lab to lab connection between test PSAP A (Vendor A) and test PSAP B (Vendor B)
- Exchange TN/ESRK/ESQKs
- Vendor A and Vendor B both need to provision an ALI record(s) in their respective systems

**Testing Scenarios:**

- **Scenario A:** Sunny Day – Transfer a call from ESInet to ESInet through an IP connection w/ ANI delivery.
- **Scenario B**: Rainy Day – Transfer a call from ESInet to ESInet through an IP connection that results in an error.

**Wireless Call Scenario:**

- Test Case 1a: PSAP A (Vendor A) transfers a wireless call to PSAP B (Vendor B – the intended PSAP) using an ESRK
    - PSAP B receives the transferred call
    - PSAP B receives the emergency callback number of the caller
    - PSAP B performs an ALI query (local to their ESInet) to validate that the ESRK is being passed correctly and an ALI query is possible
    - PSAP B verifies that ALI data is returned (the ALI formatting is not being validated as part of the test)

- Test Case 2b: PSAP A (Vendor A) transfers a wireless call to PSAP B (Vendor B);
    - Vendor B sends a SIP error response;
        - As a result of CHE issue or issue with the PSAP being able to accept the call
        - As a result of the ESInet being unable to process the call
    - When Vendor A fails to complete the transfer, verify the call stays online and a 'transfer fail' message or message indicating failure* is displayed

    *The response to an error may differ by ESInet provider – it is important to understand the messages may differ

- Test Case 3a: PSAP B (Vendor B) transfers a wireless call to PSAP A (Comtech) using an ESRK
    - PSAP A receives the transferred call
    - PSAP A receives the emergency callback number of the caller
    - PSAP A performs an ALI query (local to their ESInet) to validate that the ESRK is being passed correctly and an ALI query is possible
    - PSAP A verifies that ALI data is returned (the ALI formatting is not being validated as part of the test)

- Test Case 4b: PSAP B (Vendor B) transfers a wireless call to PSAP A (Vendor A);
    - Vendor A sends a SIP error response;
        - As a result of CHE issue or issue with the PSAP being able to accept the call
        - As a result of the ESInet being unable to process the call
    - When Vendor B fails to complete the transfer, verify the call stays online and a 'transfer fail' message or message indicating failure* is displayed

    *The response to an error may differ by ESInet provider – it is important to understand the messages may differ

Repeat each test case using a TN and ESQK to simulate a wireline and VoIP calls

# APPENDIX F – AGREEMENT TEMPLATE

This Agreement is between the <***State of __"A"_____***,> acting through its <department name> on behalf of the Emergency Communication ***<name>*** (“” ***<common name>***), and the <***State of __"B"_____***,> acting on behalf of the <***State B> name***> department of _____ (“<***common name>***”).

**Recitals**

**WHEREAS, <*State A>,*** under _____ Statutes ***<statute reference>***, is empowered to engage such assistance as deemed necessary; and

**WHEREAS, <*State B>***, under ***<State B>*** Code Chapter ***XX*** is empowered to engage such assistance as deemed necessary; and

**WHEREAS,** the Emergency Communication ***<common name>,*** a division of the ***State of __"A"_____*** Department of ***<name>*** 911 program is the lead agency for state name and the ***<State "B" name>*** and ***<Agency Name>*** 911 Program is the lead agency for ***<State B name>***; and

**WHEREAS, <*Common name agency A>*** and ***<common name agency B>*** wish to collaborate to integrate the transitional Next Generation 911 (“NG911”) systems; and

**WHEREAS, <*Common name agency A>*** and ***<common name agency B>*** wish to enter into an Agreement identifying the transitional NG911 services to be tested and ultimately provided by the collaborative; and

**WHEREAS, <*Common name agency A>*** and **<common name *agency B>*** have engaged network providers who will assist ***<State A>*** and ***<State B>*** in testing and in the provision of network elements necessary for the function and interfaces to ensure systems integration and connectivity requirements for call processing and transitional NG911 call management;

**NOW, THEREFORE,** in consideration of the covenants and conditions outlined in this Agreement and for other good and valuable consideration, each to the other, receipt of which is hereby acknowledged by both parties, ***<State A>*** and ***<State B>*** hereby agree on the following sections of the Agreement:

**Agreement**

## 1 Introduction

The ***<Agency A>***, acting on behalf of ***<State A>'s*** Public Safety Answering Points ("PSAPs"), and the ***<Agency B>***, acting as administrator of ***<State B>'s*** statewide joint powers agreement for Next Generation 911 service, recognize the need for interstate communication, connectivity, network interface and cooperation required to provide seamless transitional Next Generation 911 (NG911) service and improve the quality of public safety services for the citizens of ***<State A>*** and ***<State B>***.

***<Common name agency A> and <common name agency B>*** have established methods, procedures and capabilities for current 911 operations and call handling in their respective states. In addition, mutual-aid agreements for 911 call-processing between the states have been implemented. The current public safety realities highlight the need for states to work together and across state boundaries to establish transitional NG911 network connectivity, across traditional jurisdictional boundaries and disciplines. Both states anticipate that end-state NG911 will facilitate the exchange of calls and data between their public safety answering points (PSAPs) and any other PSAP in the country that has meets the requirements of an end-state NG911 system.

As ***<common name agency A>*** and ***<common name agency B>*** progress in their implementations of NG911, the parties agree that periodic review of and/or modification to this Agreement or an entirely new agreement may become necessary. ***<Common name agency A> and <common name agency B>*** acknowledge any modifications to this Agreement must be by mutual consent as identified in section 8.2 of this Agreement.

To increase greater interstate communications and shared responsibilities that are present in transitional NG911 systems, ***<common name agency A> and <common name agency B>*** and their respective 911 service providers are cooperating to develop an interstate network solution. This solution establishes connectivity between the Emergency Services Networks (ESInets), and 911 public safety answering points in each state, with procedures that are mutually agreed to by the parties and used by key 911 public service officials, 911 public safety and response officials, and public and private service participants in the provision of 911 call taking and incident response services in their respective states.

## 2 Purpose

The purpose of this transitional NG911 interconnectivity Agreement is to provide reasonable network testing procedures, interface and connectivity, infrastructure management, communications structure, and processes for production traffic and transitional NG911 call handling. These will apply to ***<common name agency A>*** and ***<common name agency B>*** public safety answering points and other key support agencies and organizations including, but not

limited to, network and database providers when transporting 911 call data and incident information that affect public safety in ***<State A>*** and ***<State B>***.

## 3 Term of Agreement

**3.1 Effective Date.** This Agreement becomes effective once executed by representatives of both ***<State A> and <State B>.***

**3.2 Expiration Date.** This Agreement will expire on **December 31, 2023**.

## 4 Definitions

The transitional NG911 system and network elements are referred to as Next Generation 911 Core Services ("Service") whether utilized as part of ***<State A>***'s or ***<State B>***'s public safety communications network or any other state's network. The Service is composed of a number of elements, technology and functions defined herein for the purposes of this Agreement. The following definitions are derived from the National Emergency Number Association Master Glossary of Terms[47] and other industry standards documents:

- Automatic Location Identification (ALI) databases. The databases which contain the caller's telephone number, the address/location of the telephone and supplementary emergency services information of the location from which a call originates, and which are queried to automatically display this information at the PSAP.
- Automatic Number Identification (ANI), Telephone number associated with the access line from which a call originates.
- Border Control Function (BCF). Provides a secure entry into the ESInet for emergency calls presented to the network. The BCF incorporates firewall, admission control, and may include anchoring of session and media as well as other security mechanisms to prevent deliberate or malicious attacks on PSAPs or other entities connected to the ESInet.
- Customer Premise Equipment (CPE). Communications or terminal equipment located in the customer's facilities; terminal equipment at a PSAP.
- Emergency Service Number (ESN). A 3-5 digit number that represents one or more ESZs. An ESN is defined as one of two types, either an Administrative ESN or a Routing ESN.
- Emergency Service Zone (ESZ). A geographical area that represents a unique combination of emergency service agencies (e.g., Law Enforcement, Fire, Emergency Medical Service) that are within a specified 911 governing authority's jurisdiction. An ESZ can be represented by an Emergency Service Number (ESN) to identify the ESZ.
- Geospatial Information Systems (GIS). A system for capturing, storing, displaying, analyzing and managing data and associated attributes which are spatially referenced.
- Internet Protocol (IP). The method by which data is sent from one computer to another on the Internet or other networks.
- Legacy Network Gateways (LNG). A signaling and media interconnection point between

[47] https://www.nena.org/?page=Glossary

callers in legacy wireline/wireless originating networks and the i3 architecture so that i3 PSAPs are able to receive emergency calls from such legacy networks.

- Legacy PSAP Gateways (LPG). An NG911 Functional Element that provides an interface between an ESInet and an un-upgraded PSAP.
- Legacy Selective Router Gateway (LSRG). The LSRG provides an interface between a 911 Selective Router and an ESInet, enabling calls to be routed and/or transferred between Legacy and NG networks. A tool for the transition process from Legacy 911 to NG911.
- Multi-protocol label switching architecture (MPLS) networks. Multi-protocol techniques applicable to any network layer protocol such as the use of IP as the network. A router which supports MPLS is known as a "Label Switching Router" or LSR. As a packet of a connectionless network layer protocol travels from one router to the next, each router makes an independent forwarding decision for that packet. That is, each router analyzes the packet's header, and each router runs a network layer routing algorithm. Each router independently chooses a next hop for the packet based on its analysis of the packet's header and the results of running the routing algorithm.
- 911 Service Providers. An entity providing one or more of the following 911 elements: network, customer premise equipment, or database services.
- Policy Routing Function (PRF). That functional component of an Emergency Services Routing Proxy that determines the next hop in the SIP signaling path using the policy of the nominal next element determined by querying the ECRF with the location of the caller. A database function that analyzes and applies ESInet or PSAP state elements to route calls, based on policy information associated with the next-hop.
- Pseudo Automatic Number Identification (pANI a/k/a routing number). A telephone number used to support routing of wireless 911 calls. It may identify a wireless cell, cell sector or PSAP to which the call should be routed.
- Public Safety Answering Point (PSAP). An entity responsible for receiving 911 calls and processing those calls according to a specific operational policy.
- Selective Routers (IPSR). The process by which 911 calls/messages are routed to the appropriate PSAP or other designated destination based on the caller's location information and that may also be impacted by other factors, such as time of day, call type, etc. Location may be provided in the form of an MSAG-valid civic address or in the form of geo coordinates (longitude and latitude). Location may be conveyed to the system that performs the selective routing function in the form of ANI or pseudo-ANI associated with a pre-loaded ALI database record (in Legacy 911 systems), or in real time in the form of a Presence Information Data Format – Location Object (PIDF-LO) (in NG911 systems) or whatever forms are developed as 911 evolves.

## 5 Agreement between the Parties

***<State A>*** and ***<State B>*** mutually agree:

- Each state will assign a primary point of contact (PPOC) for administrative purposes.

- Each state will authorize the transfer of 911 calls from the other state's PSAPs to be delivered to PSAPs within their own state.
- Each state will be responsible for the provisioning of their respective network solution provider systems to enable call transfer functionality which may, in some cases require provisioning of more than one system or vendor system.
- Each state will be responsible for the testing and verification of provisioning.
- Each state will have the responsibility to provision and maintain the neighboring state's pANIs to its database provider at each state's own cost.
- Each state will have the responsibility to share any pANI changes occurring within one of its border PSAPs with the neighboring state.
- Each state mutually agrees to a pANI reconciliation on a biannual basis of the border pANI ranges to ensure the database records are consistent within the respective databases used for 911.
- Each state mutually agrees to provision and be responsible for the costs of call transfers to the other state.
- Each state will be responsible to coordinate vendor and PSAP resources for testing.
- Each state will be responsible for answering transferred 911 calls, processing the call and determining the appropriate response to the call event.
- Each state will be responsible to notify the other state's PPOC in advance of any changes to be made to the core services network impacting the other state interface or system. The change notification process is outlined in Exhibit A, Change Notification Process, which is attached and incorporated into this Agreement.
- Each state will be responsible to report issues related to 911 call delivery to the other state and work with the other state's respective solution provider to collaboratively troubleshoot issues to the mutual satisfaction of both states.
- Each state mutually agrees calls will be transferred via ESN-based call transfer with ALI bids performed by the receiving agency. Changes to this methodology will be made in a collaborative manner to achieve agreement on the technical and operational interfaces required to support the evolution of each state's next generation 911 network technologies.
- Each state will provide an escalation point of contact for reporting issues 24x7x365 days per year.
- Each state will be diligent in its effort to resolve issues in an expeditious manner in alignment with its respective network solution provider agreement(s).
- Each state will authorize its respective network services solution provider to provision its network to enable call and data transfers to the other state. This provision shall be limited to only PSAPs and the 911 traffic as designated by each state's authoritative agency.
- Each state will authorize the initial routing of 911 calls to the other state directly where the other state would have dispatch authority as determined by the location of the incident. Each state agrees these routing decisions will be reviewed on a case-by-case

basis by the parties, wireless sector by wireless sector.

**6 Payment**

***<State A>*** and ***<State B>*** shall each be responsible for its own costs pursuant to this Agreement. The States mutually agree there will be no payments made by one state to the other.

**7 Authorized Representatives**

***<State A>***'s Authorized Representative is the following individual or her successor:

| | |
|---|---|
| Name: | _____, <Title> |
| Address: | Department or Agency Name |
| | Address |
| | City, ST ZIP |
| Telephone Number: | xxx.xxx.xxxx |
| Email Address: | name.name@state.xx.us |

***<State B>***'s Authorized Representative is the following individual or his successor:

| | |
|---|---|
| Name: | _____, <Title> |
| Address: | Department or Agency Name |
| | Address |
| | City, ST ZIP |
| Telephone Number: | xxx.xxx.xxxx |
| Email Address: | name.name@state.xx.us |

**8 Assignment, Amendments, Waiver, and Agreement Complete**

**8.1 Assignment.** Neither state may assign or transfer any rights or obligations under this Agreement without the prior consent of the other state and a fully executed Assignment Agreement, executed and approved by the same parties who executed and approved this Agreement, or their successors in office.

**8.2 Amendments.** Any amendment to this Agreement must be in writing and will not be effective until it has been executed and approved by the same parties who executed and approved the original agreement, or their successors in office.

**8.3 Waiver.** If either state fails to enforce any provision of this Agreement, the failure by that state does not waive the provision or the state's right to enforce it.

**8.4 Agreement Complete.** This Agreement contains all negotiations and agreements between ***<State A>*** and ***<State B>***. No other understanding regarding this Agreement, whether written or oral, may be used to bind either party.

**9 Sovereign Immunity and Liability**

Neither party waives its sovereign immunity or its governmental immunity by entering into this Agreement, and each party fully retains all immunities and defenses provided by law with regard to any action based on this Agreement. ***<State A>*** and ***<State B>*** agree each party will be responsible for its own acts and the results thereof to the extent authorized by law and shall not be responsible for the acts of any others and the results thereof. ***<State A>***'s liability shall be governed by provisions of the ***<State A>*** Tort Claims Act, ***<State A> Statutes § xxxx***, and other applicable law. ***<State B>***'s liability shall be governed by provisions of ***<State B> Code Chapter xxx*** and other applicable law.

**10 State Audits**

Under ***<State A>*** Statutes ***§ xxx***, ***<State B>***'s books, records, documents, and accounting procedures and practices relevant to this Agreement are subject to examination by ***<State A>*** and/or ***<State A>'***s State Auditor or Legislative Auditor, as appropriate, for a minimum of six (6) years from the end of this Agreement.

***<State A>***'s books, records, documents, and accounting procedures and practices relevant to this Agreement are subject to examination by the ***<State B>*** and/or its State Auditor, as appropriate, for a minimum of six (6) years from the end of this Agreement.

**11 Government Data Practices**

Both parties shall comply with the ***<State A>*** Government Data Practices Act, ***<State A>*** Statutes Chapter ***XX***, and ***<State B>*** Code Chapter XX and ***<State B>*** Administrative Code (***XXX***) Chapter ***XX***, as they apply to all data provided by the State of ***<State A>*** or the State of ***<State B>***, respectively, under this Agreement, and as they apply to all data created, collected, received, stored, used, maintained, or disseminated by ***<common name Agency A>*** or ***<common name Agency B>*** under this Agreement.

The civil remedies of ***<State A>*** Statutes § ***xx.xx*** apply to the release of data referred to under the ***<State A>*** Government Data Practices Act. ***<State A>*** Statutes Chapter ***XX***. The civil remedies of applicable ***<State B>*** Code apply to the release of data referred to under ***<State B>*** Code Chapter ***XX*** and ***<State B>*** Administrative Rule, Section ***XXX*** Chapter ***XX***.

If ***<common name Agency B>*** receives a request to release data under the ***<State A>*** Government Data Practices Act, ***<State A>*** Statutes Chapter ***XX***, ***<common name Agency B>*** must immediately notify the State of ***<State A>***. The State of ***<State A>*** will give ***< common name Agency B>*** instructions concerning the release of the data to the requesting party before the data is released and ***<common name Agency B>*** will comply with such directive if not in conflict with ***<State B>***'s Open Records law.

If ***<common name Agency A>*** receives a request to release data under ***<State B>*** Code Chapter ***XX*** and Chapter ***XX***, ***<common name Agency A>*** must immediately notify the State of ***<State B>***. The State of ***<State B>*** will give ***<common name Agency A>*** instructions concerning the release of the data to the requesting party before the data is released and ***<common name Agency A>*** will comply with such directive if not in conflict with ***<State A>***'s Government Data Practices Act.

**12 Governing Venue**

Should a dispute or offense of this Agreement be identified, the laws of either the State of ***<State A>*** or the State of ***<State B>*** shall govern this Agreement depending on the circumstances of the dispute or offense. If an offense to the Agreement is identified by a state, the laws of the defending state shall govern this Agreement and all legal action necessary to enforce the provisions of this Agreement will be held in the location designated by the defending state. Venue for litigation involving this Agreement shall be the defending state in the designated jurisdictional location and court.

**13 Termination**

Either party may terminate this Agreement at any time, with or without cause, upon 90 days' written notice to the other party, such notice to be made to the other party by certified mail, return receipt requested, by the withdrawing party to the other party of this Agreement. If the proposed termination is due to a conflict between ***<common name agency A>*** and ***<common name agency B>*** relating to terms of this Agreement, the parties shall first attempt to resolve the conflict.

1. **STATE OF <State B: _____**

Printed Name:

Signature: _____

Title:

Date: _____

2. **STATE OF <State A>: _____**

Printed Name:

Signature: _____

Title:

Date: _____

3. **COMMISSONER OF ADMINISTRATION**
   ***As delegated to the Office of State Procurement***

Signature: _____

Date: _____

ADMIN ID _____

**Exhibit A**
**Change Notification Process**

The change notification process outlined in this exhibit shall serve as the overview of activities, notifications and follow-up actions that are required of the parties when any material change to the system(s), network, database, PSAP configuration or other element to the transitional system change.

The change notice shall be served to the respective Authorized Representative designated in the Agreement at the earliest possible time to allow the other party to take appropriate action if required to protect their own systems. Coordination of changes that impact the operation of or the cost to the other party shall be considered of paramount importance by the both parties.

Change notices should be sequentially numbered and copies of the request maintained in each party's records in accordance with record keeping best practices for at least three (3) years.

A positive acknowledgement or concurrence by the receiver of the notification shall be part of the Change Notification Process.

# APPENDIX G – LEGISLATIVE REVIEW

**LEGISLATIVE REVIEW**

**Conducted: <date>**

**By:**

## 1. Legislative Guidance Pertaining to Governance and the Establishment of Authorities

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| **General** | | | |
| Read/review current legislation and rules | | | |
| Understand NG911 Migration Plan for the State | | | |
| Read and understand federal laws | | | |
| Understand legislative process and timelines | | | |
| Understand composition of legislative body, priorities, committees that will hear the legislation, the chairs of those committees | | | |
| Understand budget timeline and funding process | | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| Definitions | List all definitions included in statute that contain legacy language to evaluate changes needed for NG911 | | |
| **Governance & State Level Authority** | | | |
| Legislation speaks to 911 as an "Essential Government Service" | Does language already exist in statute? If not consider if it is appropriate to do so in your state? | | |
| The establishment of a state-level authority (referred to throughout this guidance as "the State 911 Office") is critical to maximizing the capabilities of 911 systems. | Does the state 911 program have the authority in statute to plan, fund, oversee and direct NG911 solutions? | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| The entity shall have a clearly defined 911 program coordination role, statewide authority to address necessary state-level functions and responsibilities, responsibility to coordinate networks statewide, and the authority to support those state-level system operational functions necessary to ensure a statewide 911 system of systems. | Does statute clearly assign the state 911 program the ability to coordinate statewide solutions for NG911 and not just legacy systems? | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| A state-level 911 authority that is comprehensive and accommodates all forms of originating telecommunication services will be required for NG911 implementation. Legislation authorizing the State 911 Office to conduct specific administrative and operational activities will ensure that the office has the necessary state powers to implement the State NG911 Plan. | Does the statute language limit in any way the ability to implement a statewide NG911 plan? | | |
| Legislation should not prohibit interstate communications. | Does the statute contain limits or prohibitions to working across state lines or borders? | | |
| While the sample language anticipates the location of a state 911 function within an appropriate state agency, said 911 function could be implemented through an independent state agency or administrative unit. | Is it clear that the state 911 function is part of a state agency or independent unit of government with the proper authorities and responsibilities to function effectively? | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| Legislation should facilitate state-level coordination of 911 service networks statewide. | Does the state 911 office have the authority to coordinate 911 service networks that include local, regional, and statewide systems? | | |
| The authority to coordinate with tribal, federal, and military systems also should be considered, as needed, and as it may already exist under State statute. | Does the state 911 office have the authority to coordinate 911 service networks that include tribal and military systems? | | |
| **State Coordination** | | | |
| Legislation should identify the baseline functions of the executive director, which entail all aspects of State 911 Office operations. | Does legislation clearly stipulate the functions of the state program and the state director? | | |
| States may have hiring and procurement laws that must be considered. | Review state procurement laws to ensure the there are no impediments to the program procuring systems for statewide NG911 solutions. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| Legislation should clarify the role and authority of local and regional 911 authorities, clearly delineating the shared responsibilities pertaining to 911 and any transition to NG911 capabilities among state, regional, and local entities. | Does statute or rules clearly outline the role of local 911 authorities and the shared responsibilities involved in NG911 transitioning? | | |
| Services that comprise a "911 system" should be included in the legislation. | You may want to specify the services that are eligible for funding and that are included as NG911 components under the state NG911 plan. | | |
| Legislation should encourage formal partnerships between jurisdictions that may experience the need to transfer requests for emergency services outside of their jurisdictional boundaries. | Does the statute allow for collaborative ventures and relationships between states and jurisdictional areas? | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| **Statewide 911 Advisory Committee** | | | |
| 911 Advisory Committee should represent critical stakeholders and should serve as a forum for guidance, coordination, accountability, and collaborative decision-making. | Does the statute or rules define how stakeholders are involved in the state 911 program, plans, or NG911 solutions? | | |
| States should consider the level of authority vested in the Advisory Committee. In some cases, states may determine that a stronger, policy board may be appropriate, with authority to review and approve State 911 Office activities. | Does the statute define the authority of the stakeholder driven committees or work groups? | | |
| Legislation should not prohibit interstate communications. | Does the statute permit and encourage communication and coordination with neighboring states and jurisdictions? | | |
| Advisory Committee membership should include representatives of critical, diverse stakeholder groups. | Is the membership of stakeholder driven involvement clearly defined and does it include the appropriate stakeholder groups? | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| Responsibility for operational and administrative support of the committee should be established. | Is the statute clear on how the stakeholder group will be supported by the state office or others? | | |
| Legislation should clearly identify the statewide 911 Advisory Committee protocols (e.g., terms of service, terms of service limitations). | Is the statute clear on the governance of the stakeholder group and its administrative management? | | |
| Reimbursement considerations (e.g., per diem) should be consistent with existing state statutes. | Does the statute clarify financial support related to stakeholder involvement? | | |
| Coordination among state, regional, and local level 911 roles and authorities should be clearly identified | Is the statute clear in the role and limits of authority of the stakeholder group? | | |
| Consider granting the Advisory Committee mediation or dispute-resolution authority regarding to local 911 planning and oversight disputes. | Does the statute address dispute resolution appropriately? | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| Legislation should require the Advisory Committee to develop an annual report to be filed with the governor and the general assembly regarding State 911 performance and activities. The report should be made available to the public. | Does the statute require an annual report on the activities and performance of the state program or the stakeholder activities? Should it? Is it public? Should it be? | | |
| The expertise of the State 911 Office should be a valuable resource to state legislators during legislative sessions for any issues related to or affecting 911, including 911 system operations, jurisdictional roles and responsibilities, and funding needs. | Is there a need to specify that the state office shall act as a resource for anything related to the 911 system in the state? | | |
| **Regulation & Standards** | | | |
| State legislation should grant the State 911 Office the authority to adopt rules to implement its coordination and oversight responsibilities in accordance with existing state rulemaking processes. | Does the statute clearly permit and direct the state office to have responsibility to establish, implement, and adherence monitor rules related to its activities and 911 in the state? | | |

## 2. Legislative Guidance Pertaining to Planning, Implementation, and Operations

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| **The State NG911 Plan** | | | |
| The State 911 Office should have explicit authority to coordinate and oversee the development and implementation of a state plan for emergency 911 communications and NG911 maturation | Is state authority clearly defined to develop and implement an NG911 plan? | | |
| Legislation should require the state NG911 plan to clearly address state, regional, and local roles in the control of all aspects of the statewide system. | Does statute require the state NG911 plan define roles of each level of responsibility in the state? | | |
| Liability and jurisdictional demarcations should be clearly identified. | | | |
| The plan should be required to include quality of service requirements to specify uniform, minimum levels of 911 service that should be consistently provided across the State. | Are Quality of Service (QoS) requirements and minimum 911 performance clearly specified? | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| State-level functions and services may include such items as GIS data sources shared by PSAPs or the operation of a statewide ESInet. | Are state level functions and responsibilities clearly outlined? | | |
| **Engagement & Cooperation with State Functions, Local Government & Vendors Related to 911** | | | |
| The State 911 Office will benefit from the explicit authority to convene and coordinate 911 efforts among public partners at the state level, tribal and/or local government level, including PSAPs, 911 authorities, regional stakeholder coalitions, and private-sector service providers (e.g., wireline, wireless, VoIP, internet, and point-of-sale retailers). | Is the state 911 program authority extended to coordinating 911 service across all govt levels and stakeholders, public and private as well as service providers? | | |
| Legislation should identify the baseline minimum of stakeholders and partners with whom the State 911 Office is expected to collaborate. | Does the statute provide guidance to the state 911 program on minimum stakeholder expectations? | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| Because governmental systems, structures, and distribution of responsibilities vary from state to state, the legislation identify partners and collaborators as representatives of functions relevant to 911 system operations and service delivery, as opposed to referencing specific departments and offices. This will enable legislation to remain effective despite any state-level organizational changes that may occur over time. | References to specific state departments, offices or agencies should be changed to functions that are required. For example, an audit requirement should not reference a specific state agency to conduct that audit but that the audit function must be conducted. In that way the state 911 program has flexibility in who shall do the function and is not restricted. | | |
| **Contracts & Agreements** | | | |
| The State 911 Office should have the explicit authority to coordinate 911 efforts with neighboring states, counties, and/or the federal government. | The authority given in statute should permit the State 911 Office to enter into federal, interlocal, and interstate contracts and agreements. | | |
| The State 911 Office will require explicit authority to procure services and contract with public and private entities to support coordinated state NG911 plan implementation in accordance with existing state procurement processes. | Do not rely on generalized language; the statute should plainly state that the state has the authority to procure and/or contract for services to support transition and implementation to NG911. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| **Compliance with Federal, State & Other Legal Requirements** | | | |
| The State 911 Office should have the authority to address and ensure compliance with relevant federal data-sharing requirements, such as the American with Disabilities Act, the Health Insurance Portability and Accountability Act, and other similar legal issues affecting 911 service. | There should be nothing in statute that precludes the state office from ensuring compliance with federal requirements. | | |
| **Data Collection & Information/Resource Sharing** | | | |
| The State 911 Office should have the authority to collect, analyze, share, and disseminate aggregates data from PSAPs and service providers, and to collect and aggregate 911 response related data to improve and maintain the quality of 911 service. Data should be protected in accordance with existing state statutes. | The statute should allow the state authority to collect data to assess 911 QoS in the state. | | |
| State legislation should apply exceptions to state privacy/confidentiality laws to permit information sharing within the public safety and public health communities. | Information sharing within appropriate safety and health entities should be explicitly permitted. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| Legislation should facilitate the sharing of anonymous or aggregated data when sufficient to address broader public safety and public health emergencies or concerns. By using access control and data rights management technologies, information required to facilitate seamless emergency response can be provided to authorized entities. | Data sharing to address public safety and health issues (e.g. COVID-19) should be permitted in a controlled and managed environment. | | |
| State regulations should allow information sharing among system providers to ensure that 911 service transitions between service providers are smooth, and to ensure that providers of different but complementary services in the NG911 environment can interconnect. | Information sharing between service providers should be allowed by statute or rules to ensure interoperability and interconnection between multiple service providers. | | |
| The state may reference existing privacy and confidentiality legislation and rules, making sure it does not contradict existing 911 privacy and confidentiality rules. | Statute or rules should ensure there is no conflict in privacy and confidentiality rules. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| **Statewide 911 System Operational & Technical Standards, Requirements & Quality Assurance** | | | |
| Legislation should ensure that the State 911 Office has the authority to define and require specific outcomes and levels of service, such as call response times, data sharing capabilities, etc. | Statute or rules should permit the state program to establish and require 911 service levels. | | |
| The State 911 Office should be subject to the same quality assurance and improvement processes as other executive branch entities and should implement internal quality assurance policies and processes. | Statute or rules should permit the state program to implement internal quality assurance policies. | | |
| Network design standards and requirements need to ensure that local and regional 911 networks can communicate with each other and share information seamlessly. | The statute should require any statewide or local/regional systems can interoperate. | | |
| Standards and requirements should address minimum training requirements, emergency medical dispatch (EMD), emergency fire dispatch (EFD), and emergency police dispatch (EPD) in coordination with the state office or appropriate director of those domains. | Statute should require minimum training of all appropriate 911 personnel. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| Standards and requirements also should address PSAP staffing. | Statute or rules should stipulate minimum staffing levels. | | |
| **Industry Standards & Requirements** | | | |
| The State 911 Office should be authorized to require the adoption and application of identified standards and best practices relating to 911 services to coordinate statewide networks | State authority in statute or rules should permit and/or direct the state program to establish standards related to 911 service. | | |
| The State 911 Office should have the authority to expect statewide compliance with updated or new standards within timeframes it deems appropriate. When standards are not applicable, or have not yet been developed, the State 911 Office should have the authority to require compliance with specified requirements, if appropriate. | State authority in statute or rules should permit and/or direct the state program to establish appropriate compliance requirements for standards related to 911 service. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| **911 Database & System Security (Physical & Cyber)** | | | |
| A state entity will have rulemaking authority regarding 911 database and system security. The State 911 Office should coordinate with that entity in the identification, adoption, and application of industry standards and requirements, regarding database and system security. | The standards or rules that the state program should be assigned to establish should include requirements to address local, regional, and state emergency network security issues, system capabilities related to role-based access controls and data rights management, and emergency network system security testing protocols as well as other relevant information security issues. | | |
| **Technical Assistance to the 911 Community** | | | |
| As part of its statutory responsibility, the State 911 Office should be required to coordinate its activities with local 911 and public safety entities. | The statute should allow the state office to have responsibility and authority to provide technical assistance to such organizations for the sake of effective statewide 911 operations and coordinated planning. | | |
| **Performance-Based Acquisition & Use of Services & Information Technology/Devices** | | | |
| State legislation should require that 911-related regulatory language be performance based and technology neutral. | Statute and rules should not contain language that is not neutral to all technologies and should be clear on desired performance outcomes. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| **911 Record & Data Confidentiality & Privacy** | | | |
| States should enable the sharing of essential information while protecting data confidentiality and addressing privacy issues. | As statutes are amended, the utilization of technology-neutral terms will better ensure that the intent to maintain privacy and security endures as technology advances. | | |
| **911 Data & Records Retention** | | | |
| Legislation should identify the state entity with authority to develop, monitor, and enforce 911 record and data retention policies applicable to calls for service, PSAPs, regional and state networks, and service providers. | Statute and/or rules should ensure the state's right and authority to establish and enforce 911 records management thresholds. | | |
| The State 911 Office should coordinate with such entity regarding 911-specific issues, including storage of 911 data and information in non-local shared databases and networks, storage of 911 data and information in local databases and networks, and maintenance of 911 call records for a specified timeframe. | Statute or rule language should address the state program ability to establish parameters for the storage of 911 data and maintenance of 911 call records for a specified timeframe. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| **911 Liability** | | | |
| Liability should be equally applicable to all service providers involved in the provision of 911 services. | Ensure that statute language affords liability protection to any service provider related to 911 service. | | |
| Liability legislation should not be limited to specific forms of communication (e.g., voice). | Statute language should not be limited to type of communication such as wireline, wireless, data, VoIP, etc. | | |
| Liability should be technology-neutral and equally applicable to video, text, telematics, and other developing communications technologies. | Statute language should be technology neutral and apply equitably to all technologies. | | |
| **911 Public Education** | | | |
| The State 911 Office should collaborate with other state entities that are able to help relate educational messaging to groups and populations with special needs or characteristics. | Educational messaging should not discriminate by population or group characteristics. | | |

### 3. Legislative Guidance Pertaining to Funding, Grant-Making, and Budget Oversight

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| **Eligible Use of 911 Funding** | | | |
| States should consider authorizing funds to be used for costs associated with developing, maintaining, operating, and upgrading 911 systems and networks solely in a manner that is competitively and technologically neutral to all types of communications services providers. | Fund authorization language in statute should be technology neutral. | | |
| States may consider using general language in the statute (as identified in the guidelines) and requiring the State 911 Office to develop detailed guidance regarding allowable costs, with input from the State 911 Advisory Committee. | Statute language related to eligible uses of 911 funds should provide sufficient guidance and include input from stakeholders. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| Expenses that states may consider permitting include the lease, purchase, engagement of "as a service" contracts, or maintenance of essential PSAP/Command Center systems/subsystems including, but not limited to necessary computer hardware, software, and database provisioning. | Statute should clearly define eligible use of 911 funds. | | |
| **Oversight, Management & Protection of Funds** | | | |
| States may consider identifying a neutral third party to administer the dedicated 911 revenue collection and distribution. | Statute should clearly indicate responsibility for administering 911 collections and distribution. | | |
| The State 911 Office should be responsible for ensuring that those funded entities providing 911 services appropriately and correctly expend the funds in accordance with statutes, program policies and regulations. | Statute should assign the authority and responsibility for ensuring compliance with fund policies and rules. | | |
| **Local, Regional & Commercial Fund Administration** | | | |
| Any governing body receiving 911 emergency surcharge funds should deposit all such funds into interest-bearing accounts where possible. | Statute or rule should require surcharge funds to be deposited in interest-bearing accounts. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| All interest earned on fund investment also should be allocated to the 911 fund. | Statute or rule should require interest from surcharge funds to be deposited in interest-bearing accounts. | | |
| The governing body should keep records identifying critical remittance information. | Records related to financial information and remittance should be clarified. | | |
| Any entity using 911 funds should adopt an annual budget and submit it to the State 911 Office for review and approval to ensure that proposed expenditures are consistent with the state NG911 plan and allowable uses. | Local 911 jurisdictions budgets should include all project revenues, the source of those revenues, and proposed expenditures by major program activities. There should be a process for the state program to validate use of 911 funds by the local jurisdiction to be consistent with the state plan and statute. | | |
| **Financial Reporting & Annual 911 Fund Audits** | | | |
| States may consider monthly, quarterly, or semi-annual reporting schedules. | Financial reporting requirements should be clearly defined. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| Legislation should require the use of appropriate accounting principles by PSAPs, 911 service providers and commercial parties, the State 911 Office, and any other recipients of 911 funding (use of funding should be exclusive to 911 service). | Statute should explicitly require all entities involved in 911 follow generally accepted accounting principles related to 911 funds. | | |
| Auditing and financial oversight authority should be specified; this authority likely will rest with a specific agency and be defined by existing auditing and financial oversight structures. | Coordination with the State 911 Office in the performance of financial audits should be required in statute. | | |
| **Protection from Raiding of 911 Funds** | | | |
| States may consider including legislation that makes it more challenging to use 911 funds for other purposes, such as requiring a super-majority to approve the use of 911 funding for non-911 purposes. | Statute and rule language should preclude the use of 911 funds for any reason other than 911. | | |

| GUIDANCE | QUESTIONS TO ASK DURING REVIEW | REVIEW & REFERENCE | RECOMMENDATION |
|---|---|---|---|
| **Grant-Making** | | | |
| The State 911 Office should have the authority to develop, implement, and oversee a state 911 program to provide 911 grants to local and regional entities to implement NG911, as appropriate, within the state's funding environment. | Statute and rules should assign the authority to grant funds to local and regional 911 jurisdictions for the purpose of implementing NG911. | | |
| **Acceptance of Grants & Gifts** | | | |
| State legislation should enable the State 911 Office to pursue, accept, implement, and/or manage federal and private grant funds and financial gifts, within the parameters of the State NG911 Plan, in accordance with existing state law, constitutional authority, and state policies. | Does the statute allow the state program to apply for and receive grants from federal or private granting organizations? | | |

# APPENDIX H – FEDERAL INTEROPERABILITY

## Benefits of Collaboration and Coordination Between State and Local 911 Authorities and the U.S. Military to Transition to NG911

The nation's 911 emergency communications systems require a transition from obsolete legacy technologies to the modern IP-based technologies and features—NG911. The transition will result in improved service delivery and a more resilient and reliable 911 system. To realize these benefits, the NG911 transition must be coordinated—including partnerships between DOD installations and state and local 911 authorities.

### ➢ Enhanced flexibility, resiliency, and survivability of 911 systems

An appropriately funded and coordinated NG911 transition will take advantage of technology advancements that have eluded most military 911 systems. Modern networks and new NG911 services will provide the nation's 911 system with improved flexibility, more robust networks with enhanced survivability, and built-in resiliency—ensuring that all requests for assistance are answered effectively whether on base or by the local community (e.g., supporting recruitment offices). Closing the capability disparity through collaboration assists DOD emergency responder organizations in meeting the requirements of several DOD policies, as well as relevant component-specific policies.

**NG911 services will bring** improved functionality, enhanced network resiliency, seamless interoperability, improved system integration and compatibility, equal accessibility, and greater capacity for innovation.

### ➢ Maintaining service parity

Maintaining service parity between civilian and military agencies is more critical in the NG911 environment. Military installations that do not migrate risk becoming islands unable to share emergency information with public safety partners in the communities in which they reside. Lack of integration will result in greater threat to life and property and degraded capabilities to fulfill obligations under normal response conditions and mutual-aid agreements. Collaboration between state and local NG911 entities and the military installations within their jurisdictions will ensure compatibility with current and emerging technologies and increased confidence in the 911 system—on the base and in the community.

### ➢ Increased data sharing—from the 911 caller all the way to the responder

Employing the technological advances readily available in the commercial communications marketplace will enable data and information sharing between military bases and emergency responders in neighboring jurisdictions or in other branches of the DOD, facilitating existing mutual-aid agreements. Legacy 911 systems have been fundamentally limited by their inability to receive/share digital data. The NG911 transition will provide new tools to help DOD 911 call-takers and base emergency responders use

broadband data to enhance situational awareness, provide more effective and safer emergency response, and better response coordination inside and beyond the "fence line."

### ➢ Improved response and enhanced operations

Improved Operations: Seamless transfers of calls and/or data between the military and local governmental communications centers; the ability to easily handle overflow 911 calls from another communications center; the ability for a civilian PSAP to directly dispatch emergency service vehicles to incidents inside the base's fence line; and enhanced back-up and overflow partnerships that are more flexible and robust can all be realized.

Improved Response: Installations, particularly those in settings with a degree of integration, are better equipped to meet DOD's vision of providing the same level of emergency services on the base that people enjoy outside the fence.

### ➢ Improved safety for physical property assets and personnel through communications interoperability among jurisdictions

A coordinated NG911 transition will result in enhanced 911 services across jurisdictional boundaries, more accurate call routing, faster and more efficient rerouting and transfer of misrouted calls, and increased collaboration between the military and local government PSAPs for improved response. A coordinated nationwide integration will help ensure that local and military communications centers and vendors are not stymied by the interface between old and new hardware and will improve overall interoperability and response effectiveness across the country.

### ➢ Improved emergency responder interoperability leads to increased responder safety

Coordinated implementation will improve functionality and interoperability for emergency responders. A coordinated, uniform NG911 environment will permit reliable integration with responder communication systems, to enable more efficient response to large scale mass-casualty incidents and natural/manmade disasters, both on and off the base.

### ➢ Alignment with the telecommunications infrastructure transition

As traditional 911 service providers replace old equipment in their networks with modern technology, the traditional methods of 911 call routing will no longer be available or those remaining using the outdated service will be responsible for paying higher costs. As legacy 911 infrastructure continues to age, replacement equipment becomes more difficult to find, more expensive to replace, and more likely to cause downtime of indispensable 911 service. A coordinated, transition to NG911 will provide authorities with improved, integrated, and interoperable communications with systems in their region.

### ➢ More efficient use of funds

Coordinated and interoperable deployment of NG911 services will allow state and local governments and their military partners to be better stewards of public and government funds. NG911 deployment will increase efficiencies (i.e., cost sharing) and reduce the long-term cost burden of operating obsolete legacy technology or dual systems for a prolonged period. Coordinated deployment will generate flexibility in the licensing terms for software and hardware suites, while more effective use of technology resources will enable virtualization, interoperability, and convergence of applications—all of which likely will reduce overall system costs.

The result is not only greater efficiencies and potentially lower costs, but optimization of investments in systems, maintenance, and technology—all while improving service delivery.

## Consequences of an Uncoordinated Transition to NG911 between State and Local 911 Authorities and U.S. Military Partners

The nation's 911 emergency communications systems require a transition from obsolete analog technologies to modern digital technologies, including NG911 systems that will support the myriad ways in which the public and the military communicate. As the DOD delays its NG911 transition due to limited resources or other policy challenges, such systems likely will develop in a piecemeal fashion. Failure to act in a timely and coordinated manner ultimately will cost money, and erode trust in one of our country's most important resources.

### ➢ Lack of coordination prolongs NG911 implementation and leaves DOD vulnerable to obsolescence and potential loss of 911 service

An uncoordinated, underfunded NG911 transition likely will take more than a decade as many military public safety installations defer implementation due to resource limitations. The result will be inconsistent service, under-served constituencies, and underutilized capabilities until all DOD 911 operations have deployed NG911. As local/state jurisdictions migrate to NG911 and transition from old legacy equipment, military installations may risk degraded 911 service, unless they coordinate efforts with local/state 911 agencies, or DOD assumes the cost of operating the old legacy system.

### ➢ Lack of coordination results in patchwork implementation with limited interoperability

Without a focused effort and adequate funding, NG911 within DOD largely will be deployed in an uncoordinated and piecemeal manner. Some bases may undertake coordinated efforts, but without direction and guidance, many will not. The result will be a patchwork system with individual base installations having widely varied capabilities and limited interoperability with each other or neighboring local 911 agencies or state systems, compromising the benefits of integrated and interconnected systems of advanced technologies.

> Failure to act in a timely and coordinated manner will cost lives, money, and erode trust.

### ➢ Lack of coordination results in missed opportunities for improved emergency response on and off the base

The emergence of advanced broadband communications puts much more powerful capabilities and functionality in the hands of military emergency responders. Without NG911, however, base emergency responders will not be able to receive the enhanced information available through text, video, and data generated by these broadband systems. The result will be an ineffective communications system and less-than-optimal response to emergency calls for help on the DOD installation, or as military personnel respond to local requests for mutual aid.

### ➢ Lack of coordination puts lives and property at risk

As the state and local public safety ecosystem moves toward NG911, operational procedures and protocols for law enforcement, fire, and emergency medical services (EMS) will adapt to the expanded communications capabilities and situational awareness provided by NG911 systems. In an uncoordinated, patchwork transition, varying jurisdictional capabilities can mean loss of NG911 features and/or interoperability between emergency communications centers, threatening the effectiveness of response and the lives of emergency responders and those they work to keep safe.

### ➢ Lack of coordination underserves the population on military installations

The increase in text and multimedia capabilities over the past decade has expanded communication opportunities for all persons. A delayed transition to NG911 leaves DOD citizenry behind in their ability to contact emergency services in ways they normally communicate. The DOD duty to protect the lives and property of those under their command thus is compromised. Many base personnel and their families utilize wireless communications, which may not be routed to base communications or even to the closest PSAP.

### ➢ Lack of coordination undermines trust in the 911 system and creates disparate service levels in the community

A delayed transition will create significant disparities in 911 features, functionality, and service levels between the local communities and their military partners, which will confuse and frustrate consumers, diminishing public trust in NG911 features and the 911 system as a whole. Although it is DOD policy to interface DOD systems with public safety networks to share information as appropriate, this can prove to be a difficult exercise in practice due to disparate systems and other DOD policies regarding information assurance and security concerns. The result will be lack of confidence in a system the public relies on to ensure their safety, or report crime or damage to life and property, whether they use a base phone or wireless device.

### ➢ Inaction creates technological obsolescence

The commercial marketplace already has largely completed the technology transition now facing the 911 community, migrating from outdated technologies to the advanced IP-based technologies to drive today's communications services and save costs. As this happens, network providers seek to retire high-maintenance and costly infrastructure as quickly as possible. Continued reliance on obsolete infrastructure will render military 911 systems that have not transitioned obsolete and isolated. The result will be increased costs to states, 911 authorities and especially DOD, which will be required to continue to support obsolete systems, resulting in greater risk of service outages and system failures. This clearly puts DOD behind local services that are progressing more rapidly to NG911.

### ➢ Inaction increases the costs of operating obsolete DOD 911 systems

During the transition to NG911, state and local public safety agencies will have to pay the implementation and initial operation costs of NG911, while also paying for the continued support of legacy systems. An extended transition period or one in which DOD does not participate will result in substantially greater costs to state and local government for these dual systems, or decisions to transfer those costs to any entity who continues to use the old legacy system. In addition, funding the NG911 transition as a series of uncoordinated programs will drive cost inefficiencies and increase the overall cost burden on 911 authorities—whether state, local or military.