pGc Paul Garstki Consulting

INDEPENDENT REVIEW

OF A PROPOSED

NEXT GENERATION 911 SYSTEM

For the
State of Vermont
Agency of Digital Services (ADS)
And
Vermont Enhanced 911 Board (Board)

Submitted to the
State of Vermont, Office of the CIO
by:

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1. EXECUTIVE SUMMARY

1.1 COST SUMMARY

IT Activity Lifecycle (years):	6
Total Lifecycle Costs:	$ 11,124,587.55
Total Acquisition Costs:	$ 2,668,247.55
New Annual Operating Costs:	$ 1,686,257.00
Current Annual Operating Costs	$ 1,920,000.00
Difference Between Current and New Operating Costs:	$ (233,743.00)

1.2 DISPOSITION OF INDEPENDENT REVIEW DELIVERABLES

Deliverable	Highlights from the Review *Include explanations of any significant concerns*
Acquisition Cost Assessment	Total Acquisition Costs (Implementation) are **$ 2,668,247.55.** This figure is, in our opinion, appropriate and cost-effective for the system as currently proposed. A comparison of annual operating costs of the core components of the 911 system – the Emergency Services Internet and Next Generation Core Services (ESInet/NGCS) is in our opinion the best comparison of system costs. The annual ESInet/NGCS cost per 500,000 of population is the most useful metric, and in this comparison, Vermont's proposed cost of $860,843.38 is about average among the 4 jurisdictions compared.
Technology Architecture Review	The proposed system is well architected, in all ways compliant with the State's Non-functional-requirements (NFRs) and the

	Board's functional requirements. It is highly recoverable, active-active architecture, with dual geographically separated data centers, and highly secure.
Implementation Plan Assessment	The selected vendor is focused solely on the NG9-1-1 market. The sample implementation plan and milestones is detailed, appropriately sequenced, and includes appropriate testing and certification. Training of Public Safety Answering Point (PSAP) personnel is accounted for, although it should be minimal, because of the State's choice to continue use of the existing Core Premises Equipment (CPE) and Geographical Information Services (GIS) platforms. As of this writing, the implementation plan is not fully populated with target dates, but it is expected that will be accomplished during contract negotiation.
Cost Analysis and Model for Benefit Analysis	Over the 6-year lifecycle of the project (1 year of implementation and 5 contract operational years), the project is expected by our calculations to result in savings to the State of approximately $1.6 million, compared to the costs of operating the current system at existing rates. Significant intangible benefits incur to the state and are listed in this section.
Impact Analysis on Net Operating Costs	The analysis shows a break-even point achieved in FY2 of the project (FY2021), the first year of system operation after implementation. The E911 Capital Replacement Contribution (2 FYs) and the Equipment Revolving Fund enhance existing E911 Special Fund monies to provide adequate funding for the approx. $2.7 million implementation cost. After that, operational costs are lower than current operational costs going forward, resulting in the calculated savings.

1.3 IDENTIFIED HIGH IMPACT &/OR HIGH LIKELIHOOD OF OCCURRENCE RISKS

NOTE: Throughout the narrative text of this document, **Risks and Issues are identified by bold red text**, and an accompanying tag (**_RISK_ID#_0_** provides the Risk or Issue ID to reference the risk, response, and reference in the Risk Register.

The following table lists the risks identified as having high impact and/or high likelihood (probability) of occurrence.

Please see the **Risk & Issues Register, in Section 10**, for details.

Identified High Impact &/or High Likelihood of Occurrence Risks in this project:

Risk Description	RATING IMPACT/ PROB	State's Planned Risk Response	Reviewer's Assessment of Planned Response
"Flash-cut" transition plan from current to new system creates potential to miss calls	**10 (Low)** **Impact 10** **Prob 1**	MITIGATE: -allow for brief (~2 weeks) "backup" operation of current system to catch any missed calls -implement IV&V if indicated when approaching cutover date	**Consistent with reviewer's recommendation**

1.4 OTHER KEY ISSUES

None

1.5 RECOMMENDATION

We recommend continuing this project with the risk mitigations agreed.

1.6 INDEPENDENT REVIEWER CERTIFICATION

I certify that this Independent Review Report is an independent and unbiased assessment of the proposed solution's acquisition costs, technical architecture, implementation plan, cost-benefit analysis, and impact on net operating costs, based on the information made available to me by the State.

_____   _____

Signature

Date

1.7 REPORT ACCEPTANCE

The electronic signature below represents the acceptance of this document as the final completed Independent Review Report.

_____   _____

State of Vermont Chief Information Officer   **Date**

2. SCOPE OF THIS INDEPENDENT REVIEW

2.1 IN-SCOPE

The scope of this document is fulfilling the requirements of Vermont Statute, Title 3, Chapter 45, §2222(g):

The Secretary of Administration shall obtain independent expert review of any recommendation for any information technology initiated after July 1, 1996, as information technology activity is defined by subdivision (a)(10), when its total cost is $1,000,000 or greater or when required by the State Chief Information Officer.

The independent review report includes:

- An acquisition cost assessment
- A technology architecture review
- An implementation plan assessment (which includes a Risk Analysis)
- A cost analysis and model for benefit analysis; and
- An impact analysis on net operating costs for the Agency carrying out the activity

2.2 OUT-OF-SCOPE

- A separate deliverable contracted as part of this Independent Review may be procurement negotiation advisory services, but documentation related to those services are not part of this report.
- Proposals and vendors other than the bidder selected as first choice through the proposed project's procurement process were not evaluated in this **Review.**

3. SOURCES OF INFORMATION

3.1 INDEPENDENT REVIEW PARTICIPANTS

Name	Date	Employer and Title	Participation Topic(s)
Barbara Neal	Nov 20, 2018	E911, Executive Director	Financial, Historical Overview, Board Participation, asst. topics
Jared Lamere	Nov 7, 2018	E911, IT Manager	Technical and Procurement
Serena Kemp	Nov 7, 2018	ADS/EPMO, Project Manager	Project Management, SPOC
Jeremy McMullen	Nov 7, 2018	E911, GIS Database Administrator	Data
Lawrence Boisse	Nov 7, 2018	E911, IT Specialist	Technical
Troy Morton	Dec 14, 2018	ADS/EA, Enterprise Architect	Enterprise Architecture
Scott Carbee	Dec 7, 2018	ADS/Security, Deputy CISO	Security
Bradley Kukenberger	Dec 19, 2018	AOA, Financial Director II	Funding
Blake DeRouchey	Jan 22, 2019	911 Program Manager, Iowa Homeland Security and Emergency Management	Iowa ESInet/NGCS costs
Steve McMurrer, ENP	Jan 22, 2019	9-1-1 Systems Administrator, Fairfax County Dept. of Public Safety Communications, Fairfax, Virginia	Fairfax County, VA ESInet/NGCS costs
Maria P. Jacques, ENP	Jan 22, 2019	Director, Emergency Services Communication Bureau, Augusta, Maine	Maine ESInet/NGCS costs

3.2 INDEPENDENT REVIEW DOCUMENTATION

The following documents were used in the process and preparation of this Independent Review

Document	Source
IT Activity Business Case & Cost Analysis (IT ABC Form) – Next Generation 911 System	State
E911 Project Charter	State
Sealed Bid Information Technology Request for Proposal for Next Generation 911 System	State
Bid Submitted by INdigital	INdigital
State of Vermont NG911 Technical Assessment Summary – INdigital Proposal	911 Authority
NG911 2020 Vendor Recommendation – Presentation to the Enhanced 911 Board (confidential)	State
Vermont Universal Service Fund Overview (Clay Purvis)	State
MOU Template for PSAP	State
RFP Evaluation Team Score Summary	State
BAFO responses – various	INdigital
NG9-1-1 Progress Across America Snapshot 2017 *https://www.911.gov/911connects/issue-1/NG911-progress-across-the-us-snapshot-now-available.html*	911.gov
Kimball Phase 1 Oregon NG911 Cost Analysis *https://www.oregon.gov/oem/Documents/kimball_phase_1_oregon_ng911_cost_analysis.pdf*	State of Oregon
Virginia Draft 911 Deployment Plan *https://www.vita.virginia.gov/media/vitavirginiagov/integrated-services/pdf/DraftNG911DepPlan.pdf*	State of Virginia
E-911 Special Fund Analysis (spreadsheet)	State

4. PROJECT INFORMATION

4.1 HISTORICAL BACKGROUND

9-1-1 emergency services developed nationally in the late 1960's to 1970's. These "legacy" services used traditional phone services deliver calls to Public Safety Answering Points (PSAPs), which in turn routed calls to emergency services based on the caller's described need and expressed location. In the 1980's, this approach was developed further into Enhanced 9-1-1 (E911 or e911), which, still using the traditional phone technology, but with routers to prioritize and separately route emergency traffic, provided the caller's phone number and address to the PSAP call takers, enhancing the deployment of appropriate emergency services. 30 V.S.A. § 7051-7061 defines the Vermont E911 system, and its governance through a representative Enhanced 9-1-1 Board (the Board).

In the 1990's, E911 began to evolve nationally to a developing standard known generally as Next Generation 9-1-1 (NG9-1-1). NG9-1-1 moves the system toward an IP-based network (although still interfacing with PSTN from carriers), uses various approaches to pinpoint the caller's location through Geographic Information Services (GIS) software and an Automatic Location Information (ALI) database. The standard is held and developed under the National Emergency Number Association (NENA) i3 standard. Adoption of the standard (which is itself evolving) is uneven nationally. Vermont is considered an "early adopter"[1] of NG9-1-1 technology. Vermont's current 911 system would be considered an NG9-1-1 system, although the statutory language refers to the system as E911.

The existing Vermont NG9-1-1 system ("the current system") has been operational since FY2016 under contract with the incumbent vendor, Consolidated Communications (Consolidated Communications Holdings, Inc.). Anticipating the expiration of the contract for the current system at the end of FY2020 or beginning of FY2021 (July 2020) and realizing that it would eventually have to consider the possible renewal of that contract, the E911 Board (the Board) decided on advice of staff to engage a third-party consultant, 911 Authority. The resulting evaluation revealed in part the existence of two major concerns about the existing contract: First, that a portion of the existing system (operated by the vendor and converting NG9-1-1 traffic between the Originating Service Providers (OSP's) and the State's current system) was not covered by the existing contract; and second, that the Service Level Agreement(s) (SLA) in the existing contract did not adequately protect the State in terms of service level definition and corresponding remedies (aka "penalties.").

With these observations in mind, the Board decided to issue a Request for Proposals (RFP) with these and other requirements reflecting the State's current technological, functional, and contractual needs and preferences while advancing the State's national "early adopter" status by moving further toward implementation of the still-evolving i3 standard. Although the Board's primary emphasis was the resolution of the contract deficiencies described above, through the procurement process a new vendor was selected, with a proposal that can realize significant savings over the project lifecycle, as well as the

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[1] Interview, *Barbara Neal*

addition of a number of new features and tangible benefits. These savings and benefits are described in sections below.

Our assessment of the procurement process was that it was well-designed, orderly and proper. Stakeholders (such as representatives of the Public Safety Answering Points (PSAPs)) were active participants in the process. ADS templates for contracts, contract addenda, and requirements both functional and non-functional were employed properly. Three proposals were received. All were scored by individual procurement team members. The combined scores were discussed, and two finalist vendors were invited to submit Best and Final Offers (BAFOs), with additional questions and some further development of requirements (such as SLA language), with suggestions provided by 911 Authority consultants. References for the selected vendor included the states of Indiana, Alabama, and New Hampshire. Results of reference checks were shared with this reviewer,[2] and were uniformly highly positive in assessment of the vendor, the vendor's subcontractors, adherence to timeline and budget, and customer responsiveness.

The procurement team selected the BAFO of Communications Venture Corp d/b/a INdigital. The vendor has been notified, and the Board (through its staff) is undertaking contract negotiations with the vendor.

INdigital is one of the few market leaders in NG9-1-1 that is solely focused on this technology (some other market participants are generalized communications companies). The vendor cooperates with the National Emergency Number Association (NENA) on Proof of Concept and Industry Collaboration Events ("ICE"), and participates on committees and working groups for APCO, the FCC, and the National 911 Program Office.[3] These characteristics point to the likelihood that the selected vendor will deliver appropriate and cost-effective state-of-the-art technology services to the State.

4.2 PROJECT GOAL

A fully hosted and redundant Next Generation 911 System that provides all the equipment and functional elements to deliver, answer, call back and conference 911 calls in the Vermont PSAPs. The term "call" in this document refers to a session established by signaling with two-way real-time media and involves a human making a request for help, i.e. voice call, text call, video call.

4.3 PROJECT SCOPE

As defined by Project Charter:

IN-SCOPE
- License access and use of required software systems;
- Develop, configure, deploy, operate and maintain the system for efficient and effective use by the State, in a Contractor-hosted production environment;

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[2] Interview, *Jared Lamere*

[3] INdigital, *Proposal in response to VT NG911 RFP,* Exhibit C, pg. 5.

- Provide a Quality Assurance/Quality Control test bed that closely mirrors the system that is implemented for the State so that State personnel can perform acceptance testing of all relevant components prior to their implementation as part of the overall solution;
- Build, configure, deploy, test and maintain connections as required in this document to connect the six Public Safety Answering Points (PSAPs) and the Board office to the ESInet;
- Build, configure, test and maintain connections to the dispatch centers that receive 911 to CAD (EIDD).
- Build, configure, deploy, test and maintain all required equipment and software at the PSAPs to meet all the requirements of the system.
- Coordinate with Telecommunication companies operating in Vermont in order to ensure calls originating from each TSPs networks will be received and delivered into the provided system;
- Establish and maintain the connectivity required to delivery SIP based 9-1-1 calls to all PSAP's;
- Work with the established TCC's to integrate text to 911 in Vermont to ensure that text to 9-1-1 service continues to be functional;
- Work with State staff to modernize and optimize certain aspects of the system, including implementation of functionality, as requested by the State, that may become commercially available during the term of this Contract;
- Configure, construct, qualify, monitor, and maintain the system in Contractor-hosted production and test environments;
- Provide an independent security assessment of the software and the system, and make process and product changes resulting from assessment recommendations;
- Train State staff in the configuration and use of the software and the system;
- Contractor must certify the system as complete, and provide any documentation or resources needed for the State of Vermont to complete and IVV (Independent Verification and Validation) if the State decides an IVV is warranted.
- Provide system updates and technical support to the State;
- Manage the system in its production environment and its test environment;
- Provide State technical staff with management and monitoring access to the system in its production environment;
- Perform all necessary data conversions;
- Cooperate with the incumbent provider to ensure a that a transition is defined with as minimal disruption as possible;
- Work with the State to enable a successful and timely Project conclusion
- Meet all requirements defined in the Bidders response/contract.

OUT-OF-SCOPE

- Computer Aided Dispatch (CAD) software;
- Radio communications and first responder communications networks;
- Operations management and administration of State of Vermont 9-1-1 staff
- Interconnection with FirstNet

4.3.1 MAJOR DELIVERABLES

Project Start Date	02/26/2018
RFP Posted	03/30/2018
Vendor Selected	10/19/2018
Independent Review Completed	02/09/2018
Vendor Contract Signed	04/01/2019
Implementation Start Date	03/30/2019
Independent Verification & Validation (IV & V)	04/01/2020
Final Acceptance	07/17/2020
Go Live	07/22/2020
Project End Date (after warranty period)	10/22/2020

5. ACQUISITION COST ASSESSMENT

Acquisition Costs	Cost	Comments
Hardware Costs	**$ 1,888,023.00**	
Software Costs	**$ 254,293.00**	
Telecom	**$ 42,693.00**	
State Personnel	**$ 63,000.00**	
Professional Services (e.g. Project Management, Technical, Training, etc.)	**$ 420,238.55**	
Total Acquisition Costs	**$ 2,668,247.55**	

5.1 COST VALIDATION:

Describe how you validated the Acquisition Costs.

All Acquisition Costs are derived from the FY1 (Implementation) column of the vendor's cost proposal, with additional costs for State Personnel and Professional Services (see **Attachment 3 – Cost Spreadsheet** for details.) We independently re-ran sums on costs to validate totals. One minor error was found in Telecom costs – this minor error finding was passed on to the project team, who will correct it in ongoing contract talks.

The vendor's cost proposal for implementation reflects fairly the licensing and hardware requirements of the solution, and the planning and management of the implementation. Costs are sufficiently itemized for clarity. Hardware, software, planning and management, and telecom costs are broken out appropriately.

In this project, the acquisition costs fairly represent the costs of implementing the system, with ongoing costs represented in the annual costs, starting in FY2.

5.2 COST COMPARISON:

We believe the most useful comparison is found in the ongoing annual operational costs.

NG9-1-1 PROGRESS NATIONWIDE

There are a number of approaches to determining which states have implemented, or are implementing, NG9-1-1. Both NENA and 911.gov publish maps showing their estimates of the current status of NG9-1-1 progress across the 50 states (NENA) or 50 state, permanently inhabited territories plus outlying islands (911.gov). The 911.gov map combines data from the National 911 Profile Database and NENA's NG911 database. Each map arrives at a slightly different estimate of NG911 status.

NG9-1-1 systems as implemented vary widely in approach, for a number of reasons: 911 governance varies from state-to-state, sometimes implemented statewide (as in Vermont), sometimes at the municipal, county, or other sub-state level, resulting in a variety of definitions for 911 jurisdictions. Location information systems (GIS) vary because they have various statutory bases and various legacy implementations. Sometimes NG9-1-1 systems operate alongside legacy systems.

COMPARING ANNUAL COSTS

We think the best comparison is the annual cost of the ESInet and associated Next Generation Core Services (NGCS), in jurisdictions which are at least reasonably comparable to Vermont by population. This reduces (but doesn't eliminate) the problem of comparing differing jurisdictions, as ESInets are more likely to be statewide, even when jurisdictions are local. We chose jurisdictions with ESInets that are fully implemented and have at least a year of operation and preferred a variety of vendors. We asked the 911 system administrators in each jurisdiction to confirm the operating costs. These jurisdictions are

Fairfax County, Virginia

- complete ESInet, standalone as ESInet although in regional system
- recent deployment
- pop VT:VA 1:1.8
- less rural, more compact
- Vendor is AT&T

Iowa

- statewide ESInet
- pop VT:IA 1:5
- PSAPs are separate jurisdictions
- Geographically larger than Vermont, more PSAPs
- Vendor is Comtech TCS

Maine

- statewide ESInet
- pop VT:ME 1:2.1
- Geographically larger than Vermont, more PSAPs
- Vendor is Consolidated (formerly Fairpoint)

VERMONT ESINET/NGCS ANNUAL COST

For the purposes of this ESInet/NGCS annual cost comparison, we *removed* from the Vermont proposed project annual cost all CPE (Solacom) and GIS (Geocomm) costs. We *included* all telecom, IP call routing platform, NGCS node support and maintenance, tertiary (MEVO) backup, and text for 911.

The total annual cost thus derived is $ 1,073,742.00

BOTTOM LINE COST

Comparing the bottom line annual costs, we see Vermont's **proposed solution is the least expensive**. This is not surprising, given the small size.
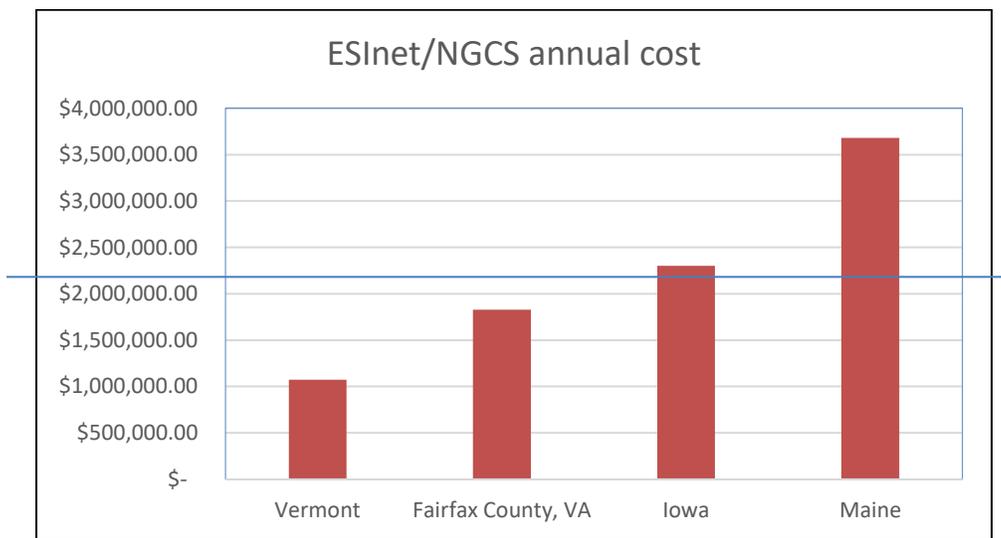
Average cost: $ 2,219,919.10

Jurisdiction	Population	annual cost
Vermont	623,657	$ 1,073,742.00
Fairfax County, VA	1,152,344	$ 1,827,574.40[4]
Iowa	3,156,145	$ 2,300,000.00[5]
Maine	1,328,361	$ 3,678,360.00[6]

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[4] Steve McMurrer, ENP*, 9-1-1 Systems Administrator, Fairfax County Dept. of Public Safety Communications, Fairfax, Virginia, Email,* Jan22, 2019.

[5] Blake DeRouchey, *911 Program Manager, Iowa Homeland Security and Emergency Management, Email,* Jan22, 2019.

[6] Maria P. Jacques, ENP, *Director, Emergency Services Communication Bureau, Augusta, Maine, Email,* Jan22, 2019.

When we normalize the comparison to cost per 500,000 of population, a perhaps more useful picture emerges. Here, we see **Vermont's proposed solution very close to the average price among the four jurisdictions**, and quite close to that of the most recent implementation (Fairfax County, VA). Iowa comes in at a quite low cost in this analysis – the 911 program manager there explains, "our ESInet itself is through the ICN (Iowa Communications Network). A state-owned fiber company that was actually built in the 90s for distance learning. We leverage that for our ESinet so costs are significantly cheaper than a private provider."
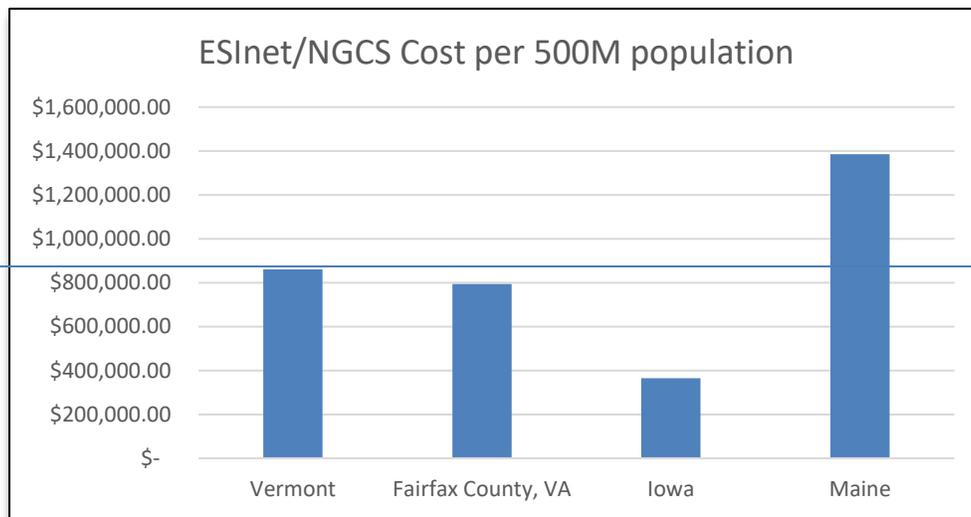
Average cost per 500M population: $ 850,685.38

Jurisdiction	Population	annual cost	cost per 500M	%
Vermont	623,657	$ 1,073,742.00	$ 860,843.38	100.0%
Fairfax County, VA	1,152,344	$ 1,827,574.40	$ 792,981.26	92.1%
Iowa	3,156,145	$ 2,300,000.00	$ 364,368.56	42.3%
Maine	1,328,361	$ 3,678,360.00	$ 1,384,548.33	160.8%

COST PER CALL

In this analysis, the annual cost per 911 call is derived from call volume figures reported by the jurisdictions. Not surprisingly, the distribution closely resembles the previous analysis, since emergency calls are fairly correlated with total population (see the 3rd column in the table below). In this analysis, we find that **Vermont has a slightly higher cost per call than the average among all four jurisdictions**. That said, we find this analysis somewhat less useful than the previous (cost per 500M population), because unusual emergencies in a given jurisdiction might skew the call volume more easily than a change in total population.

ESInet/NGCS
cost per call
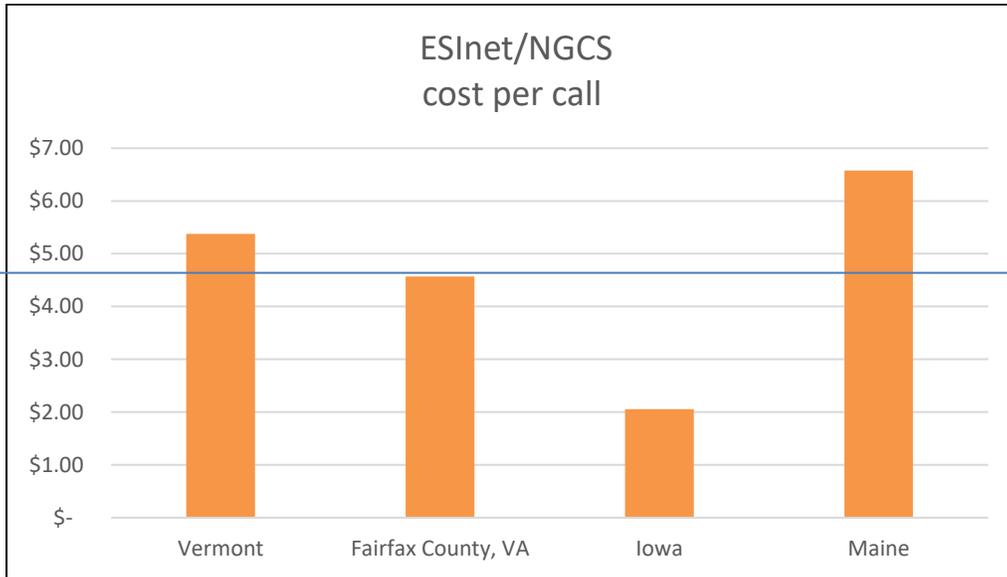
Average cost per call: $ 4.64

Jurisdiction	# calls annually	calls per person of population	cost per call
Vermont	199,791	0.32	$ 5.37
Fairfax County, VA	400,000	0.35	$ 4.57
Iowa	1,120,359	0.35	$ 2.05
Maine	559,323	0.42	$ 6.58

CONCLUSION

- o In this analysis of annual costs for ESInet/NGCS, we find Vermont's proposed cost to be by far the lowest by simple bottom line comparison.
- o In a more useful comparison of annual cost per 500,000 of population, we find Vermont's proposed cost to be almost exactly average among the 4 jurisdictions compared.
- o In a comparison of annual cost per 911 call, we find Vermont's proposed cost to be slightly above the average of the 4 jurisdictions compared.

We think the annual ESInet/NGCS cost per 500,000 of population is the most useful metric, and in this comparison, Vermont's proposed cost of $ 860,843.38 / year is average among the 4 jurisdictions compared.

IMPLEMENTATION COSTS

Implementation costs are a less useful focus of comparison, since they may include non-ESInet/NGCS hardware, software, planning, and project management; since some jurisdictions may employ a different implementation approach (e.g., Fairfax County is part of an opt-in regional proposal); and since items related to legacy systems may be included. However, for completeness' sake, we show the comparison of implementation costs below. *Note these are not necessarily pure ESInet/NGCS.*
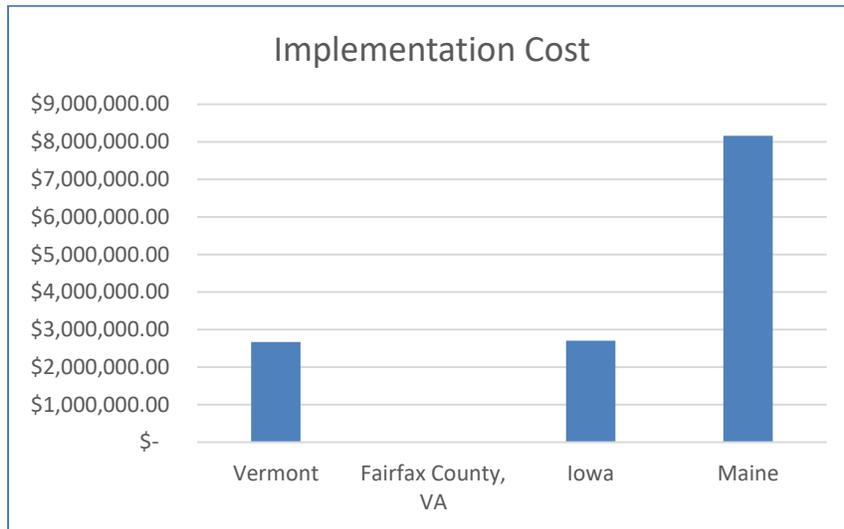
Average implementation cost: $ 3,383,790.39

Acquisition Costs	Implementation Cost
Vermont	$ 2,668,247.55
Fairfax County, VA	$ 4,000.00
Iowa	$ 2,700,000.00
Maine	$ 8,162,914.00

In this comparison, Vermont's cost is below average.

5.3 COST ASSESSMENT:

Are the Acquisition Costs valid and appropriate in your professional opinion? List any concerns or issues with the costs.

Yes, we think the Acquisition Costs are both valid and appropriate.

Concerning some hardware items in the cost proposal (Solacom host equipment, associated equipment and Geocomm hardware), we recommend that the State verify in the contract the terms of ownership, maintenance, and any necessary replacement planning.

Additional Comments on Acquisition Costs:

As stated above, for comparing costs we think the annual ESInet/NGCS cost per 500,000 of population is the most useful metric, and in this comparison, Vermont's proposed cost of $ 860,843.38 / year is about average among the 4 jurisdictions compared.

6. TECHNOLOGY ARCHITECTURE REVIEW

In the proposed solution (see diagram in Attachment #1), there are 2 fully redundant data centers, one in Manchester, NH, and one in Williston, VT. The Originating Service Providers (OSPs) connect to these datacenters, using either SIP connections or SS7. A toll-free 800 number failover service is provided as a backup pathway. Emergency calls that come through the OSPs are "processed" by the ESInet, and then are passed on to the Solacom (CPE) controllers (also fully redundant) at the data centers.

Connections between the 6 PSAPs (plus the Board office in Montpelier) and the datacenters employ two fiber paths from each location connecting to each of the datacenters, minimizing the possibility of a single point of failure. The fiber paths are provided by two different vendors (Firstlight and Comcast), in our opinion providing further diversity to avoid any failure from a carrier-wide outage. All provisioning of the fiber paths are included in the implementation costs of the proposal, and any needed build-out would be the responsibility of the vendor.

Outgoing calls from the PSAPs to the Public Switched Telephone Network (PSTN) employ SIP trunks from Firstlight and a Diverse Carrier. Traffic between the datacenters and INdigital is via VPN through Comcast and Firstlight.

We find the proposed system in general and specific terms to be appropriate, reliable, and secure.

The State's functional requirement for system capacity requires that the system be sized to handle 2.5 times a typical Vermont annual call volume (199,324 X 2.5 = 498,310 calls per calendar year). The vendor's proposal indicates compliance, and explains:

> *The proposed Solution includes Next Generation Core Service nodes (NGCS) that process both voice and nonvoice media. Each node is capable of processing over 5000 simultaneous SIP sessions. Peak processing has been tested to 14,000 sessions per second.[7] The proposed Solution makes use of diversity and redundancy for all Functional Elements (FE) used for call delivery, handling, and emergency service functions. Network Elements are also diverse, and use fiber transport with Synchronous Optical Networking (SONET) ringed configurations.[8]*

The proposed solution consists of "A" and "B" nodes, and each node is engineered to process 100% of the normal call load.

The proposed solution maintains the use of the State's current platforms for CPE (Solacom) and GIS (GeoComm). Although there might be some version differences between the new and existing versions of these platforms, any need for major retraining of call-takers or adjustment to new platform management is minimized. We support the State's decision to continue employing these platforms, and the vendor's proposal is fully compliant.

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[7] Proposal, part 3.1 functional and non-functional requirements, ID #1

[8] *Ibid.,* ID #2

The proposed solution includes the Texty platform to provide text-to-911 services (Text-to-911, Text-from-911). This supports real time text (RTT) and also allows transferring non-voice media from one user to another.

The main function of a 911 system is to ensure that all calls are handled safely and securely, and that no calls are missed or dropped. The redundancy and active-active architecture of the proposed system ensures primary and secondary paths for all calls. In this system, a tertiary backup system has been proposed by the vendor and accepted by the State: this is the VoIP-phone based system the vendor calls **MEVO**. This is described in more detail in **6.5 Disaster Recovery**, *below*.

6.1 STATE'S IT STRATEGIC PLAN

DESCRIBE HOW THE PROPOSED SOLUTION ALIGNS WITH EACH OF THE STATE'S IT STRATEGIC GOALS AND ACTIVITIES:

Transform our customer experience

- *Deliver measurable value to our partners in state government*
- *Engage early and often*
- *Be honest about the scope of our challenges*
- *Work with agencies to understand their mission*
- *Invest in Agency and project success*
- *Innovate and Operate effectively, efficiently*

The proposed solution advances Vermont's status as an early adopter of NG9-1-1 standards and technology, enhancing citizen safety, State efficiency, and cost effectiveness. New technologies are carefully integrated, and the system allows for evolution in step with the evolving NENA i3 standard.

Invest in our technology

- *Master the fundamentals to be the best*
- *Balance the value of developing new capabilities with project risk & cost*
- *Provide training and empower our employees*

The Board project team relied extensively on ADS resources and procurement advice, producing a well-developed RFP and selection process, eliciting in response detailed and effective proposals.

Secure Vermont's data

- *Continuous improvement requires continuous education*
- *Reuse existing technology solutions before buying new, buy before build*

The proposed solution continues the use of the CPE and GIS platforms, maintaining continuity that will reduce the need for additional training and enhance public safety through call-taker experience. The entire solution is fully hosted and managed and involves no State build of software or hardware.

Develop Strategic Partnerships

- *Security is everyone's responsibility*
- *Data, not systems, is our most important asset*

The proposed system is highly secure. Data centers meet or exceed State requirements and preferences. Attestations and audit results are provided regularly as required by State.

Leverage Cloud Services

> *Aggressively support and drive the State of Vermont's Software as a Service First and Preferred Cloud services strategies. Where and when possible, technology services (applications, systems, and data) should virtualize resource allocation and leverage cloud computing. Services should abstract resource allocation and avoid the tight binding of its resources to owners of the service.*

The nature of a NG9-1-1 system means that it cannot be a complete Software as a Service (SaaS) solution, since portions of the solution rely on State or local resources (such as PSAP locations) and hardware supporting Call Premises Equipment (CPE) and Geographic Information System (GIS) platforms. However, beyond this, the solution as a whole is presented as a *service*, with data center hosting, bandwidth, software, design, and integration provided on a service basis after initial implementation. This gives the State minimal capital investment and maximum flexibility should circumstances change in the future.

IT and Business Alignment

> *Information management decisions are to be made under the business alignment perspective to generate maximum benefits for Agencies and the State as a whole. IT must direct its processes towards the business goals of Agencies and the State. IT architecture must implement a complete IT vision that is focused on business. Application development priorities must be established by and for the entire state. Application components must be shared among all areas of the Agency and the State when capable.*

The origins of this project in the consultant's analysis of the existing system in light of E911 Board business needs demonstrates the tight coordination of business and IT objectives. Business goals (including NG9-1-1 requirements and evolving standards) have informed and been informed by the State's IT vision and preferences, for resilience, security, sustainability, and cost efficiency.

Federated Support Model (FSM)

> *An operational framework designed to carry out the State's IT strategy using a federated approach utilizing layers of system administrator roles and responsibilities with strong governance.*

The FSM worked well in the inception of this project and in the procurement process. The Board staff leaned heavily on ADS-supplied support (project management) and advice (Enterprise Architecture input into functional requirements and NFRs, ADS-supplied templates for RFP and

contract development). We note approvingly that the primary staff movers of this project actively sought and received internal support through ADS and procurement resources, compensating for their relative inexperience in specifically procurement roles.

6.2 SUSTAINABILITY

The solution employs primarily industry-standard software (Solacom for call handling and GeoComm for location mapping) with some proprietary software in the INdigital SaaS portion. Hardware and protocols are all industry standard, and the ESInet portion is IT based and in all practical ways compliant with NENA i3 standards where they are defined. These characteristics ensure that the solution is reasonably sustainable – there is small likelihood that any portion of the solution will need premature replacement due to technological obsolescence or a change in standards, at least during the project's lifecycle.

However, the likelihood is not zero, due to the evolving nature of the i3 standard, and the fact that portions of it are incomplete at this time. (i.e., the i3 at this time is not a "build-to" standard, but an end-state architecture.[9]) We identify this as a risk **_ID# _R5_**, although in fact an unavoidable one, which applies to any NG9-1-1 architecture, planned or extant, and indeed to the current system. Therefore, it is possible that a portion or portions of the i3 standard could evolve during the project lifecycle, resulting in the need to reconfigure part of the solution. The vendor calls its approach to this state of affairs a "practicality filter,"[10] and relies on the vendor's familiarity with the i3 end-state, extensive experience nationally, and prominence in the i3 development conversation to ensure the best possibility of architecturally sustainable choices in these grey areas. Specifically, the vendor states, "INdigital has chosen to apply a 'practicality filter', adopt and focus our work only on the most valuable and reliable subsets of the evolving I3 standard."

The State accepts that this risk exists, and the currently proposed contract language puts the onus on the vendor to maintain compliance:

> 1.1. **I3 Compliance** – The system must be compliant with the version of the NENA I3 standards and best practices in effect at the time of system implementation. In addition, the successful vendor will commit to compliance with I3 standards and best practices that are released subsequent to implementation, and to make the transition to remain compliant with I3 standards in a timely and efficient manner following release of those standards and best practices.

Similarly, the evaluation of the vendor's proposed solution carried out by 911 Authority states that the vendor's approach to PSAP Certificate Authority (PCA) and encryption implementation "seem[s] to deviate a bit, or perhaps [the vendor has] implemented the standard differently."[11] However, this is a case where NENA is still developing this standard and it is not yet applied uniformly. We identify this as a

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[9] 911 Authority, *NG911 Technical Assessment Summary – INdigital Proposal*

[10] INdigital, *18-289 responses to VT follow up questions*, p. 13.

[11] 911 Authority, *NG911 Technical Assessment Summary – INdigital Proposal,* p. 4.

risk **_ID#_R6_**, although a small one, for the reasons given above. Again, we recommend that the State accept this risk in light of the vendor's approach and experience.

6.3 SECURITY

SECURITY VS. PRIVACY

Every 911 system receives and handles various kinds of information specific to the individuals initiating the emergency calls. Although probably not meeting the limited legal definition of protected Personally Identifiable Information (PII) as defined in Vermont statute (9 V.S.A. § 2430), this information could potentially be used to identify an individual (and would meet a broader definition of PII, such as for example the federal definition at 2 CFR 200.82). This information is stored in the form of call recordings, and in various forms in the ALI database maintained by the vendor: Telephone name, Customer name, Address, and sometimes a disability code, and Premise Information which sometimes relates to a person's health.[12] There is a need for confidentiality, as defined in 30 V.S.A. § 7059 Confidentiality of System Information. PSAP call takers and others who may touch confidential information are trained and tested in confidentiality practice[13].

In the solution as a whole, the primary focus as we see it is on assurance of *security*, i.e., protecting the system itself from tampering or interference from bad actors, or compromise of confidential information as described above. The worst-case scenario for a 911 system is not being able to take and/or process calls.[14] Our discussions with the State's security analyst for this project shows that he has independently arrived at the same conclusion.[15]

SECURITY

The vendor's solution meets all State RFP Security requirements and standard Information Technology (IT) contract provisions for security.[16] The vendor states that "The proposed Solution takes a holistic approach following the NIST framework and NENA's NG Sec. Inventory and classification of the systems and data are dependent upon the governance of the 9-1-1 authority. Our solution uses the NIST 800-53 publication to evaluate the results of that inventory and classification to determine the best controls to

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[12] Lamere, *IR draft comments,* January 4, 2019.

[13] Interview, *Barbara Neal.*

[14] *Ibid.*

[15] Interview, *Scott Carbee.*

[16] State of Vermont, *Standard Contract Provisions for IT,* Attachment D

be implemented based on the levels of confidentiality, integrity, and availability required."[17] This is in keeping with the State's requirement for PII data.

The solution as proposed employs 2 data centers, operated by a subcontractor, one data center located in Vermont, and one located in New Hampshire. The New Hampshire location also hosts part of the vendor's solution for the New Hampshire 911, and while physically and logically separated, this co-hosting provides enhanced opportunity for regional inter-ESInet connection of the 2 state systems, a desirable feature for the State. Data center security controls are appropriate and extensive, and SOC 2 Type II evaluations are employed. According to the State security analyst, the State would expect to see annual attestations of these evaluations and any Plans of Action and Milestones (POAM) as appropriate. This expectation will be in the contract.[18]

ENCRYPTION

All traffic between the data centers and the PSAPs that traverse the ESiNet will be protected by NENA compliant network security provided by INdigital.

The proposed GeoComm GIS applications access cloud-based ALI resources over the Internet. The GeoComm transport channels are HTTPS compliant and secured by 256 bit encryption.

The Solacom CPE application roadmap anticipates additional encryption support via Secure SIP and sRTP (Secure Realtime Transport Protocol) becoming available in 2019.

6.4 COMPLIANCE WITH THE SECTION 508 AMENDMENT TO THE REHABILITATION ACT OF 1973, AS AMENDED IN 1998

N/A

6.5 DISASTER RECOVERY

The proposed solution is apparently designed for redundancy in all functional aspects. The design is active-active, meaning that redundant components are fully operational at all times (i.e., a component does not need to be restored or brought online for use when needed), meaning that any component or host failure should not impact the reception and routing of calls. All calls should be successfully routed around a point of failure.

MEVO

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[17] INdigital Proposal, *3.2 Data Compliance*, p.5 of 6

[18] *Ibid.,* Attachment D

The vendor offers, and the State will deploy, a "tertiary" service continuity device known as MEVO. This portable component uses a VoIP phone with screen to replicate most functions of a PSAP station, and thus can be used to provide emergency call handling even in the event of geographical disruptions (for example, physical damage to a PSAP location). We think this is a significant addition to disaster recovery and call reliability and identify it below as an intangible benefit.

The State would deploy a MEVO unit to each of the PSAPs. The MEVO system comprises an out-of-band call handling platform to provide service continuity as a "network of last resort." It is integrated into the NGCS platform to provide NG9-1-1 features including ALI and call transferring and conferencing in the event of a primary and secondary failure. In the event that both Solacom controllers became unavailable (i.e., primary and secondary backup down) the NGCS will deliver the 911 calls to the PSAPs on the tertiary route (MEVO) over LTE.

All call takers at all PSAPs would be trained in use of the MEVO. The State anticipates that, since call takers are experienced in complex call handling via VoIP phones, training will be straightforward. We agree.

The following diagram, extracted from the vendor's proposal, places the MEVO in context:
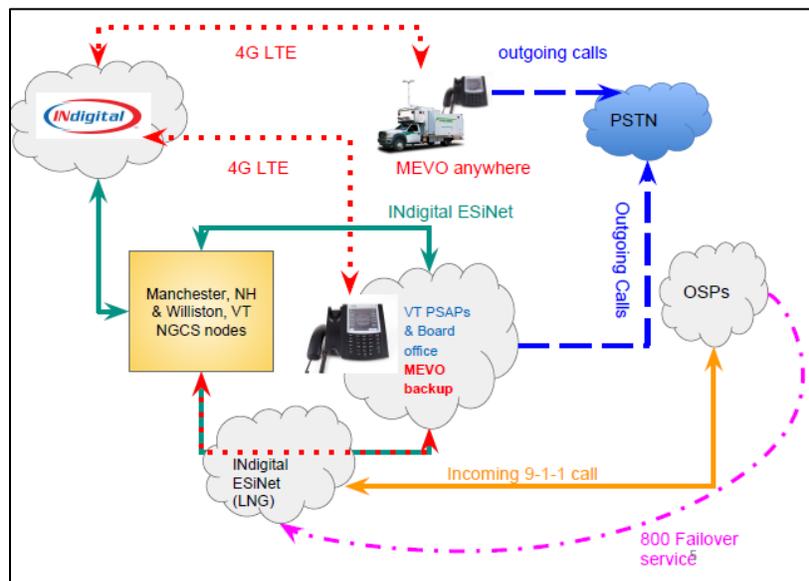
OSP CONNECTIONS

We note that, in a 911 solution from any vendor, true redundancy and failover resilience depends not only on the system provider (including internetwork provider(s), etc.), but also on the redundancy provided by the Originating Service Providers (OSPs). As the vendor writes in the proposal, in response to a requirement that the proposed solution be able to maintain all services in a failover:

> *"The proposed Solution complies with this requirement. However, attaining full redundancy requires that the Originating Service Providers (OSP) establish redundant connections to the*

ESi-Net. If a carrier is connecting via legacy technology such as SS7, the carrier would need to support a legacy protocol called crankback, which allows the establishment of an alternate route if the main connection has an impairment. Crankback may not be available from some OSPs.

Providers connecting via SIP protocol can use a SIP Option messaging to allow for the call to be maintained during an outage of in process calls. The system and services provided by INdigital supports RTP redirects, however we can not [sic] validate ingress carrier connection methods or capabilities at this time."[19]

The Board and its staff have long-established and productive relationships with local OSPs. However, the statement by the vendor identifies correctly the fact that the vendor is not responsible for the cooperation by the OSPs (although the vendor can help and facilitate these interactions where appropriate.) The State intends to work diligently with the vendor and OSPs to ensure timely action.

6.6 DATA RETENTION

Nothing in the capacity or architecture of the proposed system imposes a practical limit on the retention period of data. The State has sole discretion on retention period of records in the proposed system, such as for example 911 call recordings and associated records, data associated with the ALI database, and data in the Citizen Assistance Registry for Emergencies. Under 1 V.S.A. § 317a (Management of Public Records), the Vermont State Archive & Records Administration (VSARA) provides guidance for record retention schedules to State entities.

6.7 SERVICE LEVEL AGREEMENT

WHAT ARE THE POST IMPLEMENTATION SERVICES AND SERVICE LEVELS REQUIRED BY THE STATE?

The proposed **Service Level Agreement (SLA)** as of the time of this review is attached as **Appendix 5**.

IS THE VENDOR PROPOSED SERVICE LEVEL AGREEMENT ADEQUATE TO MEET THOSE NEEDS IN YOUR JUDGMENT?

Yes. This is especially important as the need for an adequate SLA formed a driving factor in eliciting proposals for this project. We find the current proposed SLA as sufficient both in its service level targets and in its proposed remedies (aka "penalties"). We find the remedies to be good compensation to the State in the event of missed service level targets, but more importantly, they are composed such as to comprise ongoing incentives for meeting service targets (i.e., they encourage the vendor to improve

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[19] INdigital Proposal, *Part 3.1*, p. 4

ongoing performance to avoid additional penalties in the event of inadequate service). Our understanding is that the vendor has agreed to adopt this SLA, as proposed by the State, in its entirety.

6.8 SYSTEM INTEGRATION

IS THE DATA EXPORT REPORTING CAPABILITY OF THE PROPOSED SOLUTION CONSUMABLE BY THE STATE?

The solution is not intended to directly export data into State databases; however, the reporting capabilities of the solution are important, as they provide a window into operation of the NG9-1-1 system, overall statistics, and performance and call-handling of the PSAPs (which impacts their compensation rates). The reporting capability of the proposed solution is extensive, interactive, highly user-oriented, and apparently broadly configurable. We think it is a significant step up from the current system.

WHAT DATA IS EXCHANGED AND WHAT SYSTEMS (STATE AND NON-STATE) WILL THE SOLUTION INTEGRATE/INTERFACE WITH?

Please create a visual depiction and include as Attachment 1 of this report.

[See attachment 1]

Will the solution be able to integrate with the State's Vision and financial systems (if applicable)?

N/A

Additional Comments on Architecture: *none*

7. ASSESSMENT OF IMPLEMENTATION PLAN

7.1 THE REALITY OF THE IMPLEMENTATION TIMETABLE

TARGET DATE

The contract for the current system expires at the end of FY 2020 (i.e., on July 29, 2020), and therefore that date is the primary timeframe constraint. The State proposes executing a contract for the new system early in CY 2019 and completing implementation very close to the expiration. The transition to the new system from the old is planned as a "flash cut," that is, to in effect shut off the old system and turn on the new one. To be ready for this cutover, the State anticipates several preparatory steps, to which the vendor has agreed.

1. Certification of the new system by the vendor
2. User Acceptance Testing
3. Independent Verification and Validation (IV&V), performed by a qualified third-party vendor (this step is also built into the costs for the new project)

We see these preparatory steps as appropriate and necessary. Given the necessity for the 911 system to handle *all* calls, we identify as a risk **_ID# _R1_** the potential to miss calls during the flash cut, and we recommend the State mitigate this risk by its (existing) plan to maintain call capacity on the old system for a short period even as the new system comes into operation. Once the new system is seen to be up and running properly in place, the old system can be retired. (This parallel operation would likely be only for a few days.)

The cutover timeframe also exposes 2 other related risks: First, we identify as a risk **_ID# _R2_** the possibility that the new system is not ready at the target date. While we view the implementation timeline as more than adequate – and therefore the risk likelihood is low – we recommend that the State monitor the timeline closely throughout the implementation, and when appropriate and if necessary, develop a plan of action to handle the overrun period, through for example contract extension (old system) and retainage (new system). We identify an opposite risk here **_ID# _R3_**, that the new system is ready substantially *before* the target date. In this event, the State could incur the costs of parallel contract periods. The State has decided that the new system would not be brought online even if ready early, and we agree that is the most straightforward approach, as it does not incur any additional cost.

IMPLEMENTATION PLAN

The vendor has proposed a phased sequence of implementation, with an associated detailed Project Plan of actions, deliverables, and milestones. (The detailed plan is included below as Attachment 4.) At this stage of contract negotiation and project development, the implementation plan does not include target dates, except for initiation and conclusion. We think this is appropriate, given the vendor's experience with similar projects, as confirmed by reference checking with other states.

The general statement of project phasing, as presented by the vendor, is shown in the table below.

Implementation Phase	Date
Project Statement of Work	Jan 1 2019
Contract	
Execute Orders	
Notify Carriers	
Build Out Network	
Install NGCS	
Install CPE	
Install Network Equipment	
Data Migration	
Carrier Kickoffs	
Monitoring	
Test Plan	
Documentation	
Training	
Signoff	July 1 2020

7.2 READINESS OF IMPACTED DIVISIONS/ DEPARTMENTS TO PARTICIPATE IN THIS SOLUTION/PROJECT (CONSIDER CURRENT CULTURE, STAFF BUY-IN, ORGANIZATIONAL CHANGES NEEDED, AND LEADERSHIP READINESS).

The Board technical staff is small, but in our opinion, highly dedicated to this project. Although the project sponsor and technical lead have been involved in the past in new system implementations, this is the first time they have each been in a lead role during the process. They have responded appropriately by meticulous use of advice from procurement and ADS resources, as well as consultation with peers in other states.

The assigned ADS enterprise architect has conveyed his assessment of the Board technical project team as highly capable and extremely knowledgeable. We agree. The staff's communication with the Board has apparently been extensive and complete, and the Board itself is clearly supportive of, and authoritative for, this project. Stakeholders (such as PSAP representatives) have been involved in the early and procurement phase development. Decisions such as that to continue use of existing CPE and GIS platforms should minimize any negative effect on PSAP efficiency or morale.

7.3 DO THE MILESTONES AND DELIVERABLES PROPOSED BY THE VENDOR PROVIDE ENOUGH DETAIL TO HOLD THEM ACCOUNTABLE FOR MEETING THE BUSINESS NEEDS IN THESE AREAS:

7.3.1 PROJECT MANAGEMENT

We assess this vendor as highly experienced and meticulous in project management. The qualifications of their proposed project manager and the structure of their project management approach look to us to be fully aligned with all State expectations and preferences, and PMBOK compliant. References from other states (Indiana and Alabama) indicate a high degree of coordination and responsiveness, which bodes well for Vermont's undertaking.

The vendor proposes to deliver these project management plans:

- WBS
- schedule baseline
- change control
- communications management
- conflict management
- acceptance test
- end of project report

The vendor will deliver these reports:

- "Lessons Learned"
- Project status reports

Technical documents will include Originating Service Provider (OSP) conversion documents, as built drawings, comprehensive test plan, build sheets, Policy Routing Function (PRF) documentation, training materials, project notes, and other ad hoc reports as needed.[20]

7.3.2 TRAINING

The proposed system continues the use of two software platforms (Solacom for call handling and GeoComm for GIS) already in use in Vermont. This should minimize the training needed for PSAP call takers and Board users. Where training is needed, the vendor proposes a "comprehensive training program" of train-the-trainer, administrator, and technical training courses.[21] Our discussions with the Board staff[22] indicate that the Board is staffed and ready to integrate new training resources into the existing training program.

7.3.3 TESTING

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[20] INdigital proposal

[21] *Ibid.,* Part 5

[22] Interview, *Barbara Neal*

All designed components of the new system are tested in an orderly manner as they are implemented. Attachment 4 identifies the testing stages of those components. Of particular interest is the testing regime for the Core Network (ESInet):

- Core Network Failover Testing
  - Functional Testing
    - Test Plan Creation
    - Functional Element Failover testing
    - Admin Failover testing
  - Final Acceptance testing
    - Test documentation Creation
    - Acceptance testing
    - Test report

Our reading of the vendor's proposal in depth, and the sample implementation plan, indicate to us that the vendor is well-versed in testing during each implementation stage, and equipped to provide adequate evidence to the State of the results of each test.

7.3.4   DESIGN

In the proposed project, design tasks will mainly consist of overall system and network integration design. There is not anticipated software development, aside from configuration appropriate to a SaaS system. The deliverables for design address implementation needs and should provide more than adequate information for the State project team to assess design decisions and progress. The vendor proposes the following deliverables and sequence:

- **Design Phase**
  - Site assessment
    - Site Survey
      - Hosts
        - Received Data Center A
        - Received Data Center B
    - Transport Requirements
      - SS7 / Sigtran design
      - Carrier trunking Ingress Network design (T1, DS3, OCx)
      - Ethernet (LAN) Network design
      - Commodity Network design
    - NG Core Network Requirements
      - Buildsheet
        - SBC, iBCF, ESRP, eBCF design complete
        - Server equipment specifications complete
        - IP Scheme developed for Core network
      - Local Network Gateway (LNG)
        - LNG equipment specifications complete
      - DACs

- o DACs specifications complete
- MEVO
  - o MEVO specifications complete

7.3.5 CONVERSION (IF APPLICABLE)

The new system will require ALI and GIS database conversion from the existing State system. The Board has an internal data resource specialist who will oversee this process with the vendor. Although the conversion process is expected to raise minimal difficulties, we identify this as a risk **_ID#_R8_**, primarily because data conversions are inherently risky. We recommend that the State and vendor engage this task very early in the process. This is in fact the vendor's own recommendation, and the State agrees.

7.3.6 IMPLEMENTATION PLANNING

See **7.3.7,** *below*

7.3.7 IMPLEMENTATION

As part of the technical services proposed, the vendor will provide Project plans, work flows, as built documentation, drawings, and escalation documentation. The sample project plan Attachment 4 identifies specific deliverables: PSAP Readiness Certification, Final Design Documentation, Test Plan Completion, a Document Toolkit, a cutover plan. As contract negotiations proceed, the State will memorialize deliverables in the agreed-upon Statement of Work (SOW). Our assessment of the current state of deliverables is that they reflect well the depth and experience of the vendor, and the needs of the State. We have no concerns in this area.

7.4 DOES THE STATE HAVE A RESOURCE LINED UP TO BE THE PROJECT MANAGER ON THE PROJECT? IF SO, DOES THIS PERSON POSSESS THE SKILLS AND EXPERIENCE TO BE SUCCESSFUL IN THIS ROLE IN YOUR JUDGEMENT? PLEASE EXPLAIN.

The Board has engaged resources from ADS. The current project manager, who has been with the project throughout the procurement phase, is highly qualified and has maintained excellent documentation. Another ADS project manager will be assigned when the project is underway. ADS staffing costs are included in the overall implementation costs in this report and in Attachment 3 Cost Spreadsheet.

Additional Comments on Implementation Plan

none

8. COST BENEFIT ANALYSIS

Given the project costs, and assumptions as listed below (8.2), we anticipate that this project will provide **savings to the State over the 6-year lifecycle of the project of approximately $1.6 million**, when compared to the hypothetical costs of continuing the existing system with current contract costs. Costs are highest in the implementation year, but a lower annual cost results in savings over time.

Significant intangible benefits incur.

8.1 ANALYSIS DESCRIPTION:

The cost savings analysis is identical to the **9. Impact Analysis on Net Operating Costs**, *below*.

Intangible benefits were identified through:

- Discussions with the Board project team comparing existing and proposed capabilities
- Vendor's proposal
- 911 Authority analysis of proposal and BAFO

8.2 ASSUMPTIONS:

- That the vendor's cost proposal (at time of writing) is an accurate representation of costs of the to-be executed contract
- That funding sources identified by the State (and verified by VISION system) are accurate and available as proposed (see below)
- That estimates of State personnel costs, including ADS support, are accurate
- That the cost of extending or renewing the contract for the existing system would be identical to the monthly/annual costs of the existing contract (this is hypothetical, for analysis only, and does not reflect any knowledge of negotiations or discussions)

8.3 FUNDING:

Provide the funding source(s). If multiple sources, indicate the percentage of each source for both Acquisition Costs and on-going Operational costs over the duration of the system/service lifecycle.

For Implementation:

The primary funding source is monies available in fund #21711, the **E-911 Special Fund**, a fund of the **Vermont Universal Service Fund** (VUSF), as summarized below[23]. Additional funds in the amount of $600,000 come from the FY2020 and FY2021 Capital Replacement Contribution, an internal annual

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[23] Email, *Bradley Kukenberger*, December 2018.

contribution designed to facilitate needed capital (equipment) replacement as need arises.[24] Also, funds in the amount of $400,000 come from the Vermont Equipment Revolving Fund, established by 3 V.S.A. § 2222(j). This latter source requires application and approval, which is currently underway. Although we have every reason to understand that the application will be approved and funds forthcoming (since the State recommended this route to the Board), we identify this as a risk **_ID# _R4_**, until the application is approved.

E-911 Special Fund Analysis - Fund #21711 -10-31-2018		
11/10/2018		
	Cash Balance as of 6/30/2018	$ 1,435,242.03
	FY19 YTD Expenditures	$ (1,276,059.65)
	FY19 YTD Revenues	$ 1,207,795.74
	E-911 Actual Cash Balance as of 9/30/2018	$ 1,366,978.12
	Remaining FY18 Expenditures	$ (3,274,646.00)
	Remaining FY19 Revenues	$ 3,623,387.22
	IV&V	$ (200,000.00)
	FY20 Capital replacement Contribution	$ 300,000.00
	Total Projected Balance Beginning of FY21	$ 1,815,719.34
	FY21 Capital Replacement Contribution	$ 300,000.00
	Equipment Loan from Equipment Revolving Fund	$ 400,000.00
	Total Projected Balance End of FY21	**$ 2,515,719.34**

For Annual Costs (maintenance):

Ongoing costs are available from the **E-911 Special Fund**, a fund of the **VUSF**. For the purposes of cost-benefit calculation, we use as a baseline the existing annual contract cost ($1,938,888[25]) and compare it to the proposed project annual cost. (See **9. Impact Analysis on Net Operating Costs**, *below*.)

8.4 TANGIBLE COSTS & BENEFITS:

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[24] Interview, *Barbara Neal*

[25] Email, *Bradley Kukenberger*, December 27. 2018.

Provide a list and description of the tangible benefits of this project. Tangible benefits include specific dollar value that can be measured (examples include a reduction in expenses or reducing inventory, with supporting details)

We anticipate a cost savings to the State of approximately $1.6 million over the 6-year project lifecycle (1 year of implementation and 5 years of ongoing contract). (For analysis see **9. Impact Analysis on Net Operating Costs**, *below*.)

We identify this amount as cost savings (rather than cost avoidance), because it represents a reduction in the amount of money the State would expend *if continuing to use the existing 911 system*. It should be noted, however, that no cost savings occur in the first (implementation) year of the project, as shown in the impact analysis below; and also, the full savings only accrue when considering the whole lifecycle. The average annual savings over the lifecycle is $271,160.96.

8.5 INTANGIBLE COSTS & BENEFITS:

Provide a list and description of the intangible benefits of this project. Intangible benefits include cost avoidance, the value of benefits provided to other programs, the value of improved decision making, public benefit, and other factors that become known during the process of analysis. Intangible benefits must include a statement of the methodology or justification used to determine the value of the intangible benefit.

- **Resolution of SLA deficiencies identified by third-party evaluation of contract**
    - *Reduces State exposure and potential financial impact*
- **Resolution of issue that existing contract did not cover SS7-to-IP LNGs**
    - *Avoids future conflict over cost, control, development*
- **Addition of tertiary, portable PSAP capabilities (MEVO)**
    - *Adds public safety component previously unavailable*
- **Enhanced regional interconnection, initially with New Hampshire**
    - *Begins movement toward a previously identified Board objective*
- **Improved alignment with evolving i3 standard**
    - *Continues movement toward NG end state, enhances Vermont's status as early adopter*
- **Consolidating PSTN-side demarcation points to data centers, rather than using tandems as aggregation points**
    - *Reduces or eliminates reliance on third-party control of aggregation points*
    - *Reduces likelihood of ingress trunking failures*

8.6 COSTS VS. BENEFITS:

Do the benefits of this project (consider both tangible and intangible) outweigh the costs in your opinion? Please elaborate on your response.

Although the realization of cost savings was not a motivation for undertaking this project, the vendor's BAFO as selected by the State represents a significant cost savings for the State. As shown in **9. Impact Analysis on Net Operating Costs**, *below,* the State should begin to realize these savings in the first year of operation after implementation.

The intangible benefits are significant and enhance public safety and convenience, and overall system efficiency. Most importantly to the original aims of the project, the contract deficiencies are resolved.

In our opinion, the benefits of this project significantly outweigh the costs.

8.7 IT ABC FORM REVIEW:

Review the IT ABC form (Business Case/Cost Analysis) created by the Business for this project. Is the information consistent with your independent review and analysis? If not, please describe.

The IT ABC form fairly represents the state of the project in February of 2018. At this time, the business objective was completion of the competitive bid process in time to anticipate expiration of the current contract in July 2020, per the instructions of the Board. At that time, cost savings were not anticipated as a benefit.

The form accurately represents funding availability and sources and approximates fairly closely the annual costs of the existing system. Implementation costs were estimated at $2,188,000, somewhat underestimating the costs of the new solution as now projected of $2,668,248. Annual operating costs for the new solution were estimated at $2,000,000, overestimating the cost as now proposed of $1,686,257. Total lifecycle costs were estimated at $12,188,000 approximately 10% higher than the costs as now estimated of $10,995,881.

The IT ABC form posits a 5-year project lifecycle. The present review, however, analyzes a 6-year lifecycle, comprising 1 year of implementation and 5 years of operation under contract.

Finally, the IT ABC form identifies 4 species of confidential/sensitive/nonpublic information in the proposed system:

- Personally Identifiable Information (PII)
- Health Related Information
- Information associated with minor children
- Other Sensitive, Confidential, or Non-Public Information

Please see the description in **6.3 Security**, *above*, regarding PII.

Additional Comments on the Cost Benefit Analysis:

none

9. IMPACT ANALYSIS ON NET OPERATING COSTS

9.1 INSERT A TABLE TO ILLUSTRATE THE NET OPERATING COST IMPACT.

	Implementation FY1	Maintenance FY2	Maintenance FY3	Maintenance FY4	Maintenance FY5	Maintenance FY6	Total
Project Costs	2,668,247.55	1,686,257.00	1,686,257.00	1,692,482.00	1,692,482.00	1,698,862.00	11,124,587.55
e911 Special Fund	1,815,719.34	1,938,888.00	1,938,888.00	1,938,888.00	1,938,888.00	1,938,888.00	11,510,159.34
FY21 Capital Replacement Contribution	300,000.00	0	0	0	0	0	0
Surplus from previous year	0	(152,528.21)	19,862.79	192,253.79	358,419.79	524,585.79	
Equipment Loan from Equipment Revolving Fund	400,000.00	(80,240.00)	(80,240.00)	(80,240.00)	(80,240.00)	(80,240.00)	0
Available Funding for FY	2,515,719.34	1,706,119.79	1,878,510.79	2,050,901.79	2,217,067.79	2,383,233.79	12,751,553.29
Net Cost over Funding	152,528.21	(19,862.79)	(192,253.79)	(358,419.79)	(524,585.79)	(684,371.79)	(1,626,965.74)
% of costs covered	94.28%	101.18%	111.40%	121.18%	131.00%	140.28%	114.62%

9.2 PROVIDE A NARRATIVE SUMMARY OF THE ANALYSIS CONDUCTED AND INCLUDE A LIST OF ANY ASSUMPTIONS.

Funding sources and costs are derived as explained in **8. Cost Benefit Analysis,** *above*. The available E911 Special Fund monies at start of FY21 are shown ($1,815,719.34) and added to the FY21 Capital Replacement and Equipment Revolving Fund to show available funding for the implementation year. Following (maintenance) years use the existing contract cost as hypothetical available E911 Special Fund monies. Any surplus or cost from the previous FY is added, and the Equipment Revolving Fund is paid back at the cost of $80,240 per year for 5

years.[26] The available funds are subtracted from the project cost each year to derive the Net Cost over Funding (positive number is cost, negative is savings). The percentage of costs covered by the available funds is shown (over 100% means savings).

9.3 EXPLAIN ANY NET OPERATING INCREASES THAT WILL BE COVERED BY FEDERAL FUNDING. WILL THIS FUNDING COVER THE ENTIRE LIFECYCLE? IF NOT, PLEASE PROVIDE THE BREAKOUTS BY YEAR.

9.4 WHAT IS THE BREAK-EVEN POINT FOR THIS IT ACTIVITY (CONSIDERING IMPLEMENTATION AND ON-GOING OPERATING COSTS)?
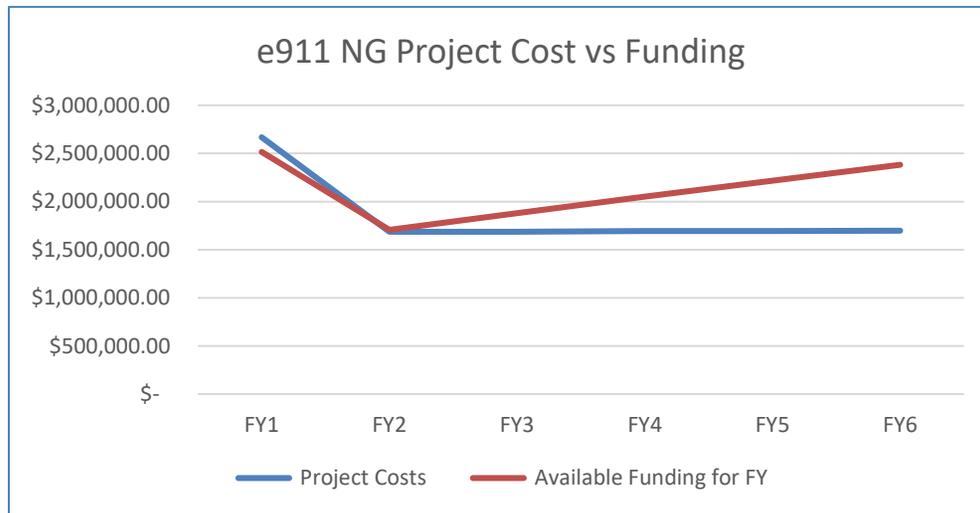
The analysis shows a break-even point achieved in FY2 of the project (FY2021), the first year of system operation after implementation.

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[26] Interview, *Bradley Kukenberger*, December 19, 2018.

10. RISK ASSESSMENT & RISK REGISTER

The risks identified throughout this review are collected below, along with an assessment of their significance, a description of the State response and timing, and our evaluation of the State response.

ADDITIONAL COMMENTS ON RISK

In our assessment, the risks in this project general fall into moderate to low total ratings (likelihood X impact, see following table). Mostly, this reflects the experience of the vendor, the long implementation timeframe, and the diligence of the project team. However, it also reflects the intentionally separate nature of the E9-1-1 system, as compared to the State IT enterprise as a whole. The 911 enterprise is designed by its nature to operate in and of emergencies, and as such it is by design not largely dependent on other portions of the State IT enterprise.

RISK REGISTER

The following table explains the Risk Register components:

Risk ID:	Identification number assigned to risk or issue.
Risk Rating:	An assessment of risk significance, based on multiplication of **(probability X impact ratings)** (*see below*).
	1-6 = low
	7-44 = moderate See table below
	45-90 high
Probability:	Assessment of likelihood of risk occurring, scale of **1,3,5,7, or 9**, from least to most likely
Impact:	Assessment of severity of negative effect, scale of **1,3,5,7, or 10**, from least to most severe
Finding:	Review finding which led to identifying a risk
Risk Of:	Nature of the risk
Risk To:	What may be impacted, should the risk occur
Reviewer's recommendation	Decision to *avoid*, *mitigate*, or *accept* risk Detailed description of response to risk, in order to accomplish decision
State's response	State's planned action in light of recommendation
Reviewer's Assessment:	Reviewers evaluation of the State's planned response

Risk Rating Matrix			IMPACT				
			Trivial	Minor	Moderate	Major	Extreme
			1	3	5	7	10
LIKELIHOOD	Rare	1	1	3	5	7	10
	Unlikely	3	3	9	15	21	30
	Moderate	5	5	15	25	35	50
	Likely	7	7	21	35	49	70
	Very Likely	9	9	27	45	63	90

Risk ID: R1	Rating:	**5**
	Probability:	**1**
	Impact:	**10**

Finding:	"Flash-cut" transition plan from current to new system creates potential to miss calls
Risk Of:	mis-handling emergency call or calls
Risk To:	citizen safety, project success, State reputation
Reviewer's recommendation	MITIGATE: -allow for brief (~2 weeks) "backup" operation of current system to catch any missed calls -implement IV&V if indicated when approaching cutover date
State's response	Agreed

	Rating:	**3**
Risk ID: R2	Probability:	**1**
	Impact:	**3**
Finding:	If new system is not ready for cutover at end of current system contract (June 30, 2020), current system operation would have to be extended	
Risk Of:	Increased cost to State	
Risk To:	project cost	
Reviewer's recommendation	MITIGATE -monitor timeline rigorously and adjust when necessary -develop plan of action in advance (e.g., contract extension + retainage)	
State's response	agreed	

Risk ID: R3	Rating:	**3**
	Probability:	**1**
	Impact:	**3**
Finding:	If new system is ready for cutover substantially before end of current system contract (June 30, 2020), current system operation is extraneous (possibly a positive risk version of above)	
Risk Of:	Unnecessary cost to State	
Risk To:	funding efficiency	
Reviewer's recommendation	MITIGATE -in the event, negotiate early contract termination of current system	
State's response	MITIGATE -do not go-live early, even if new system is ready (i.e., stay on schedule)	

Risk ID: R4	Rating:	5
	Probability:	1
	Impact:	5

Finding:	Currently designated funding does not cover entire cost of implementation (but acknowledge that Equipment Revolving Fund approval would cover gap)
Risk Of:	insufficient funding
Risk To:	project funding, project success
Reviewer's recommendation	MITIGATE -apply for $400K internal loan from Equipment Revolving Fund -cost gap is minimal and could be addressed by feature contraction if necessary
State's response	MITIGATE -911 Board is following recommendation of Finance and Mgt in pursuing this course; sufficient funding is available and has been confirmed

	Rating:	**12**
Risk ID: R5	Probability:	**3**
	Impact:	**4**

Finding:	Portions of i3 stage 3 standard are still incomplete at this time (i.e., it is not a "build-to" specification, but an end-state architecture)
Risk Of:	Change of architecture if system needs to be modified for compliance during project lifecycle
Risk To:	Project architecture
Reviewer's recommendation	ACCEPT - Contract states 1.1. **I3 Compliance** – The system must be compliant with the version of the NENA I3 standards and best practices in effect at the time of system implementation. In addition, the successful vendor will commit to compliance with I3 standards and best practices that are released subsequent to implementation, and to make the transition to remain compliant with I3 standards in a timely and efficient manner following release of those standards and best practices. -vendor's "practicality" approach to i3 and strong participation in NENA i3 standards development provide reasonable assurance of future compliance without stalling modernization
State's response	agreed

Risk ID: R6	Rating:	**12**
	Probability:	**3**
	Impact:	**4**

Finding:	According to third-party advice (911 Authority), the vendor's approach to PSAP Certificate Authority (PCA) and encryption implementation "seem[s] to deviate a bit, or perhaps [the vendor has] implemented the standard differently." However, NENA is still developing this standard and it is not yet applied uniformly.
Risk Of:	Change of architecture if system needs to be modified for compliance during project lifecycle
Risk To:	Architecture
Reviewer's recommendation	ACCEPT: -Same as above
State's response	agreed

	Rating:	**5**
Risk ID: R8	Probability:	**1**
	Impact:	**5**

Finding:	ALI and GIS database migration could raise issues
Risk Of:	timeline delay
Risk To:	implementation timeframe
Reviewer's recommendation	MITIGATE: -follow vendor's recommendation to begin data migration as soon as possible in implementation timeline
State's response	agreed

11. ATTACHMENTS

Attachment 1 – Illustration of System Integration

Attachment 2 – Risk & Issues Register Summary

Attachment 3 – Cost Spreadsheet

Attachment 4 – Vendor's sample implementation plan

Attachment 5 – Proposed Service Level Agreement, as of September 25, 2018

proposed network architecture for Vermont

4G backup

PSAPs

Hartford PD
Lamoille
CSD
Saint Albans
Shelburne
Westminster
Williston
Board office
Montpelier

Firstlight Fiber

Comcast Fiber

Firstlight Fiber

Comcast Fiber

Vermont INdigital ESINET

Firstlight Fiber

Comcast Fiber

Comcast Fiber

Firstlight Fiber

Williston, VT Data Center NGCS & Solacom controller

77 Sundial Manchester, NH NGCS & Solacom controller

Diverse carrier redundancy between Datacenters, redundancy for PSAPs

VPN Comcast

Outgoing Calls via Firstlight SIP trunks

Incoming 911 calls

800 Failover service

800 Failover service

Incoming 911 calls

Outgoing Calls via Diverse Carrier SIP trunks

VPN Firstlight

Originating Service Providers

PSTN

INdigital

4

ATTACHMENT 2 - e911 INDEPENDENT REVIEW -- Risk and Issues Register -- version 3.1.a -- **2019 - January - 34 -- Paul E. Garstki, JD -- Paul Garstki Consulting**

								1-6 = low
RISKS	What is the finding that leads to identifying a risk? (This is a highly condensed version that is explained more fully in the report narrative)	What exactly are the risks implied by the finding?	What aspects of the project are at risk if the risk(s) are realized?	What is the Independent Reviewer recommending?	What is the State's response to the recommendation(s) (e.g., agree, or alternative risk response.)	1,3,5,7, or 9	1,3,5,7, or10	**7-44 = moderate**
	Note: Risk ID # list may have gaps, in order to maintain consistency with earlier drafts							**45-90 high**

Risk #	Finding	risk of	risk to	Reviewer Recommendation Timeframe in [brackets]	SOV response	likelihood 1-9	impact 1-10	total rating
R1	"Flash-cut" transition plan from current to new system creates potential to miss calls	mis-handling emergency call or calls	citizen safety, project success, State reputation	MITIGATE: -allow for brief (~2 weeks) "backup" operation of current system to catch any missed calls -implement IV&V if indicated when approaching cutover date	Agreed	1	10	10
R2	If new system is not ready for cutover at end of current system contract (June 30, 2020), current system operation would have to be extended	Increased cost to State	project cost	MITIGATE -monitor timeline rigorously and adjust when necessary -develop plan of action in advance (e.g., contract extension + retainage)	Agreed	1	3	3
R3	If new system is ready for cutover substantially before end of current system contract (June 30, 2020), current system operation is extraneous (possibly a positive risk version of above)	Unnecessary cost to State	funding efficiency	MITIGATE -in the event, negotiate early contract termination of current system	MITIGATE -do not go-live early, even if new system is ready (i.e., stay on schedule)	1	3	3
R4	Currently designated funding does not cover entire cost of implementation (but acknowledge that Equipment Revolving Fund approval would cover gap)	insufficient funding	project funding, project success	MITIGATE -apply for $400K internal loan from Equipment Revolving Fund -cost gap is minimal and could be addressed by feature contraction if necessary	MITIGATE -911 Board is following recommendation of Finance and Mgt in pursuing this course; sufficient funding is available and has been confirmed	1	5	5
R5	Portions of i3 stage 3 standard are still incomplete at this time (i.e., it is not a "build-to" specification, but an end-state architecture)	Change of architecture if system needs to be modified for compliance during project lifecycle	Architecture	ACCEPT - Contract states 1.1. I3 Compliance – The system must be compliant with the version of the NENA I3 standards and best practices in effect at the time of system implementation. In addition, the successful vendor will commit to compliance with I3 standards and best practices that are released subsequent to implementation, and to make the transition to remain compliant with I3 standards in a timely and efficient manner following release of those standards and best practices. -vendor's "practicality" approach to i3 and strong participation in NENA i3 standards development provide reasonable assurance of future compliance without stalling modernization	Agreed	3	4	12
R6	According to third-party advice (911 Authority), the vendor's approach to PSAP Certificate Authority (PCA) and encryption implementation "seem[s] to deviate a bit, or perhaps [the vendor has] implemented the standard differently." However, NENA is still developing this standard and it is not yet applied uniformly.	Change of architecture if system needs to be modified for compliance during project lifecycle	Architecture	ACCEPT: -Same as above	Agreed	3	4	12
R8	ALI and GIS database migration could raise issues	timeline delay	implementation timeframe	MITIGATE: -follow vendor's recommendation to begin data migration as soon as possible in implementation timeline	Agreed	1	5	5

ISSUES   none at this time

NOTES:

Attachment 3: Next Generation 911 System Cost Spreadsheet -- ver. 2.0

Description	Initial Implementation	Maintenance	Maintenance	Maintenance	Maintenance	Maintenance	Total
Fiscal Year	FY 1	FY 2	FY 3	FY 4	FY 5	FY 6	
Software							
Enterprise Application: License Fees	$ -	$	$	$	$	$	$ -
INdigital - IP Call Routing Platform	$ -	$ 374,194.00	$ 374,194.00	$ 374,194.00	$ 374,194.00	$ 374,194.00	$ 1,870,970.00
INdigital - Service Continuity System [MEVO]	$ -	$ 30,600.00	$ 30,600.00	$ 30,600.00	$ 30,600.00	$ 30,600.00	$ 153,000.00
INdigital - ALI database service	$ -	$ 37,419.00	$ 37,419.00	$ 37,419.00	$ 37,419.00	$ 37,419.00	$ 187,095.00
INdigital - text FOR 911	$ -	$ 74,839.00	$ 74,839.00	$ 74,839.00	$ 74,839.00	$ 74,839.00	$ 374,195.00
INdigital - 911 Logix	$ 18,500.00	$ 34,839.00	$ 34,839.00	$ 34,839.00	$ 34,839.00	$ 34,839.00	$ 192,695.00
Geocomm - Enterprise Application	$ -	$ 44,347.00	$ 44,347.00	$ 44,347.00	$ 44,347.00	$ 44,347.00	$ 221,735.00
Solacom - text TO and FROM 911	$ 11,871.00	$ -	$ -	$ -	$ -	$ -	$ 11,871.00
Maintenance &/or License Fee Add-ons	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subscription cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Storage Limitation and/or Additional Fees	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Database Software: License Fees	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Middleware Tools: License Fees	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating System Software: License Fees	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Upgrade Costs for Later Years	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Geocomm - upgrade costs for later years	$ -	$ 44,138.00	$ 44,138.00	$ 44,138.00	$ 44,138.00	$ 44,138.00	$ 220,690.00
Support and Maintenance Fees	$ -	$ -	$ -	$ -	$ -	$ -	$ -
INdigital - NGCS node support & maintenance	$ -	$ 124,356.00	$ 124,356.00	$ 124,356.00	$ 124,356.00	$ 124,356.00	$ 621,780.00
Geocomm - support and maintenace	$ -	$ 333,990.00	$ 333,990.00	$ 333,990.00	$ 333,990.00	$ 333,990.00	$ 1,669,950.00
Solacom - prepaid manufacturer support (5 years)	$ 223,922.00	$ -	$ -	$ -	$ -	$ -	$ 223,922.00
AK - PSAP maintenance & support (24x7)	$ -	$ 249,000.00	$ 249,000.00	$ 255,225.00	$ 255,225.00	$ 261,605.00	$ 1,270,055.00
Software Total	$ 254,293.00	$ 1,347,722.00	$ 1,347,722.00	$ 1,353,947.00	$ 1,353,947.00	$ 1,360,327.00	$ 7,017,958.00
Hardware							
Computer Hardware							
Solacom - Hartford	$ 46,062.00	$ -	$ -	$ -	$ -	$ -	$ 46,062.00
Solacom - Lamoille	$ 53,571.00	$ -	$ -	$ -	$ -	$ -	$ 53,571.00
Solacom - Saint Albans	$ 53,571.00	$ -	$ -	$ -	$ -	$ -	$ 53,571.00
Solacom - Shelburne	$ 41,662.00	$ -	$ -	$ -	$ -	$ -	$ 41,662.00
Solacom - Westminster	$ 106,458.00	$ -	$ -	$ -	$ -	$ -	$ 106,458.00
Solacom - Williston	$ 155,355.00	$ -	$ -	$ -	$ -	$ -	$ 155,355.00
Solacom - Board Office	$ 140,078.00	$ -	$ -	$ -	$ -	$ -	$ 140,078.00
Storage and Backup Hardware							
Network Hardware							
NGCS Core hardware & Software	$ 507,126.00	$ -	$ -	$ -	$ -	$ -	$ 507,126.00
NGCS Lab Environment	$ 47,756.00	$ -	$ -	$ -	$ -	$ -	$ 47,756.00
Geocomm - hardware requirement	$ 304,774.00	$ -	$ -	$ -	$ -	$ -	$ 304,774.00
Solacom - Host Equipment - Krupp	$ 113,266.00	$ -	$ -	$ -	$ -	$ -	$ 113,266.00
Solacom - Host Equipment - Sundial	$ 105,786.00	$ -	$ -	$ -	$ -	$ -	$ 105,786.00
Solacom - Lab system	$ 65,705.00	$ -	$ -	$ -	$ -	$ -	$ 65,705.00
Solacom - MIS recorder	$ 88,623.00	$ -	$ -	$ -	$ -	$ -	$ 88,623.00
Solacom - Spares	$ 54,164.00	$ -	$ -	$ -	$ -	$ -	$ 54,164.00
Facilities/Data Center							$ -
Krupp colocation rent	$ 2,033.00	$ 37,752.00	$ 37,752.00	$ 37,752.00	$ 37,752.00	$ 37,752.00	$ 190,793.00
Sundial colocation rent	$ 2,033.00	$ 18,876.00	$ 18,876.00	$ 18,876.00	$ 18,876.00	$ 18,876.00	$ 96,413.00
Hardware Total	$ 1,888,023.00	$ 56,628.00	$ 56,628.00	$ 56,628.00	$ 56,628.00	$ 56,628.00	$ 2,171,163.00
Consulting							
Other	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Independent Review	$ 16,880.55	$ -	$ -	$ -	$ -	$ -	$ 16,880.55
Consulting Total	$ 16,880.55	$ -	$ -	$ -			$ 16,880.55
Training							
Other	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Training Total	$ -	$ -	$ -	$ -			$ -
Telecom							
Bandwidth							
St. Albans - primary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
Hyde Park - primary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
White River - primary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
Shelbourne - primary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
Putney - Primary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
Montpelier - primary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
Williston - primary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
St Albans - secondary [50 megs]	$ 2,033.00	$ 8,561.00	$ 8,561.00	$ 8,561.00	$ 8,561.00	$ 8,561.00	$ 44,838.00
Hyde Park - secondary [50 megs]	$ 2,033.00	$ 8,561.00	$ 8,561.00	$ 8,561.00	$ 8,561.00	$ 8,561.00	$ 44,838.00
White River - secondary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
Shelbourne - secondary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
Putney - secondary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
Montpelier - secondary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
Williston - secondary [50 megs]	$ 2,033.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 5,850.00	$ 31,283.00
45 Krupp DC - primary [350 megs]	$ 2,033.00	$ 1,235.00	$ 1,235.00	$ 1,235.00	$ 1,235.00	$ 1,235.00	$ 8,208.00
77 Sundial DC [250 megs]	$ 2,033.00	$ 1,105.00	$ 1,105.00	$ 1,105.00	$ 1,105.00	$ 1,105.00	$ 7,558.00
Krupp to Sundial [100 megs]	$ 2,033.00	$ 8,580.00	$ 8,580.00	$ 8,580.00	$ 8,580.00	$ 8,580.00	$ 44,933.00
45 Krupp DC - secondary [50 megs internet]	$ 2,033.00	$ 9,087.00	$ 9,087.00	$ 9,087.00	$ 9,087.00	$ 9,087.00	$ 47,468.00
Krupp - secondary [500 megs]	$ 2,033.00	$ 15,903.00	$ 15,903.00	$ 15,903.00	$ 15,903.00	$ 15,903.00	$ 81,548.00
Sundial secondary [500 megs]	$ 2,033.00	$ 15,903.00	$ 15,903.00	$ 15,903.00	$ 15,903.00	$ 15,903.00	$ 81,548.00
SIP Trunks - PSTN connection	$ 2,033.00	$ 9,360.00	$ 9,360.00	$ 9,360.00	$ 9,360.00	$ 9,360.00	$ 48,833.00
Telecom Total	$ 42,693.00	$ 148,495.00	$ 148,495.00	$ 148,495.00	$ 148,495.00	$ 148,495.00	$ 785,168.00
Implementation Services							
Project Management							
Geocomm - Project Management	$ 136,668.00	$ 62,638.00	$ 62,638.00	$ 62,638.00	$ 62,638.00	$ 62,638.00	$ 449,858.00
Requirements	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Design (Architect Solution)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Development (Build, Configure or Aggregate)/Tes	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solacom - Development of RFP Requirements	$ 112,360.00	$ -	$ -	$ -	$ -	$ -	$ 112,360.00
System Testing	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Defect Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Implement/Deploy or Integrate	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Geocomm - implement/deploy or integrate	$ 20,963.00	$ 70,774.00	$ 70,774.00	$ 70,774.00	$ 70,774.00	$ 70,774.00	$ 374,833.00
Solacom - Installation Service	$ 107,210.00	$ -	$ -	$ -	$ -	$ -	$ 107,210.00
Solacom - Managed Services	$ 20,157.00	$ -	$ -	$ -	$ -	$ -	$ 20,157.00
Quality Management	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Training	$ -	$ -	$ -	$ -	$ -	$ -	$ -
PSAP call handing training	$ 6,000.00	$ -	$ -	$ -	$ -	$ -	$ 6,000.00
Implementation Services Total	$ 403,358.00	$ 133,412.00	$ 133,412.00	$ 133,412.00	$ 133,412.00	$ 133,412.00	$ 1,070,418.00
Personnel Additional							
State Labor (ADS Services)[1]	$ 63,000.00	$ -	$ -	$ -	$ -	$ -	$ 63,000.00
Project Management (contracted by State)[2]		$ -	$ -	$ -	$ -	$ -	$ -
Personnel Additional Total	$ 63,000.00	$ -	$ -	$ -	$ -	$ -	$ 63,000.00
Hosting							
Hosting Fees	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hosting Total	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Column Totals:	$ 2,668,247.55	$ 1,686,257.00	$ 1,686,257.00	$ 1,692,482.00	$ 1,692,482.00	$ 1,698,862.00	$ 11,124,587.55

	checksum	$ 11,124,587.55
vendor only	vendor only	$ 11,044,707.00
	minus error	$ (48,826.00)
		$ 10,995,881.00

Notes:	IT ABC	$ 12,188,000.00
		90.22%

ATTACHMENT 4 – E911 Independent Review – vendor INdigital Sample Implementation Plan

January 1 2019 to July 1 2020

- **Data Center**
  - **Data Center Installation**
    - **Project Plan**
      - Signed Scope of Work
      - Receipt of PO
    - **Design Phase**
      - Site assessment
        - Site Survey
          - Hosts
            - Received Data Center A
            - Received Data Center B
      - Transport Requirements
        - SS7 / Sigtran design
        - Carrier trunking Ingress Network design (T1, DS3, OCx)
        - Ethernet (LAN) Network design
        - Commodity Network design
      - NG Core Network Requirements
        - Buildsheet
          - SBC, iBCF, ESRP, eBCF design complete
          - Server equipment specifications complete
          - IP Scheme developed for Core network
        - Local Network Gateway (LNG)
          - LNG equipment specifications complete
        - DACs
          - DACs specifications complete
        - MEVO
          - MEVO specifications complete
    - **Development Phase**
      - Host Site Hardware
      - Data Center A
        - Equipment
          - VM Host
          - Core Routers
          - Core Switches
          - Local Network Gateway (LNG)
          - DACs ordering
          - MEVO Phones
        - OSP transport
        - SS7 Ordering
      - Data Center B
        - Equipment
        - MEVO Phones

- OSP transport
- SS7 Ordering
- **Implementation Phase**
  - Transport
  - DACs Installation
    - Data Center A
    - Data Center B
  - VM Server Installation
    - Data Center A
    - Data Center B
  - Core Routers
    - Data Center A
    - Data Center B
  - Core Switches
    - Data Center A
    - Data Center B
  - LNG Installation
    - Data Center A
    - Data Center B
      - Dialogic 1010 Installation
      - SS7 / Sigtran Installation & testing
      - OSP POI Transport (DS3) Turn Up and Tested
      - Router to Router Turned Up & Tested
      - Transfer Codes Confirmed
    - MEVO Phone Installation
      - Data Center A
      - Data Center B
  - NG Core Network
    - Data Center A
      - Network Management
      - Stack Provisioning
      - Data Center A As-built documentation (Build Sheet)
    - Data Center B
      - Network Management
      - Stack Provisioning
      - Data Center B As-built documentation (Build Sheet)
    - Core Network Failover Testing
      - Functional Testing
        - Test Plan Creation
        - Functional Element Failover testing
        - Admin Failover testing
      - Final Acceptance testing
        - Test documentation Creation
        - Acceptance testing
        - Test report
  - Final Design Documentation
- **911 services**

- **Vermont**
  - PSAP Physical Network Configuration
  - Project Kick Off
  - Site Survey
    - PSAP Survey and Questionnaire Received
  - Survey Documentation Received
    - Initial PSAP design
    - Texty confirmed
    - Rack assignments
    - LAN assignments
    - WAN assignments
    - Call Flow Design
      - Call routing documentation complete
      - Call flow logical diagram complete
  - Initial Design Sign Off
  - PSAP router documentation
    - Configuration specs
    - Router equipment order
    - Router received
    - Router build and stage
    - Router installation
    - Router test and soak
      - Router monitoring and management initiated
      - Documentation of monitoring and management system
    - Router cut over
  - Redline Design Changes Documented
  - PSAP MEVO Cabling (as required)
    - Cable estimates
    - Cable design complete
    - Run cable
    - Cable Termination
    - Test LAN WAN
    - Install VoIP Phone
    - Ready for service
  - Network Readiness Complete
    - NID *installed*
    - *VLAN Provisioning Complete*
    - *CPE Equipment Installed*
    - *Tertiary network established (Commodity Internet)*
      - *Tertiary network services documented*
      - *Tertiary network services designed*
      - *Tertiary network services ordered*
      - *Tertiary network services installed*
      - *Tertiary network services tested*
  - *Admin/PCAP Server (as required)*
    - *Admin/PCAP connections documented*
    - *Admin/PCAP connections designed and installed, initial test*

- o *Admin/PCAP SIP turned up and tested, final test*
- *LNG Design (audio codes - as required)*
  - o *LNG design completed*
  - o *LNG ordered*
  - o *LNG recieved*
  - o *LNG configured, installed, and initial testing*
- *911 MEVO connections*
  - o *MEVO connections documented*
  - o *MEVO connections designed and installed*
  - o *MEVO Phone turned up and tested*
- PSAP Readiness Certification
- Final Design Documented
- Test Plan Completion
- PSAP routers
  - o WAN validation and failover
    - Primary
    - Secondary
    - Tertiary
- ESRP Software Applications
  - o ESRP Operational
  - o Policy Routing
  - o Policy Routing Failover
    - Primary failover
    - Secondary failover
    - Admin failover
    - MEVO failover
  - o Database operational
    - SRDB transitional conversion documented
  - o PSAP toolkit Application
    - Tool kit credentials documented
    - Tool kit PSAP setup complete
    - Tool kit verified
  - o Training
    - MEVO (as required)
    - Texty (as required)
    - Toolkit (as required)
  - o Carrier Network Conversion
  - o Phase 1A - LNG & CPE Configuration tasks w/CPE provider
  - o Phase 1B - Confirm CPE Cutover Date
  - o Phase 2 - ESRP Configuration
  - o Phase 3A - Carrier Trunks installed
  - o Phase 3B - Carrier conversion
    - Wireless Conversion
    - Wireline Conversion
- PSAP Closeout Complete
- **Carrier Conversion Management**
- **Carrier Conversion Plan/Preparation**

- o Receipt of Carrier List from PSAP(s)
- o Validate Carriers
- **Prepare Carrier Notification**
  - o Prepare Data Gathering Form
  - o Prepare Preliminary Trunk Diagram
  - o Get Letter of Authorization (LOA)
  - o Schedule Tentative Cut Date
  - o Schedule Kick Off Call (Calendar Date)
- **Distribute Notification Documents to Carriers**
  - o Send Reminder Message
- **Carrier Kick Off Meeting (All Carriers)**
  - o Review Trunk Diagram
  - o Confirm preferred connectivity, SIP/SS7
  - o Review and Schedule Return of Data Gathering Form
  - o Schedule Recurring Project Calls
  - o Finalize Carrier List
  - o Finalize Cut Date
  - o Create MOP
  - o Carrier MOP Review (Project Call)
- **LECs**
  - o **LEC 1**
    - ▪ Log Carrier Notification Date
    - ▪ Data Gathering Form recieved
    - ▪ Confirm Point of Interface (POI)
    - ▪ Secondary Contract Requested (as required)
  - o **Establish Facilities**
  - o **Facilities**
    - ▪ Facilities Ordered
    - ▪ Facilities Complete
  - o **Trunks**
    - ▪ Trunks Ordered
    - ▪ Trunks Complete
  - o **SS7/ISUP (as required)**
    - ▪ Submit SS7/ISUP Connection Order
    - ▪ Connection Order Complete
    - ▪ Test Continuity
    - ▪ Verify Secondary Contract Executed (as required)
    - ▪ Schedule Call-through Testing
    - ▪ Complete Call-through Testing
    - ▪ Validate MOP Complete
    - ▪ Cut Complete
- **Final Project Cut Complete**
- **CPE project**
  - **INdigital/Customer Signed Contract Received**
  - **Internal Project Kick Off**
    - o Meeting Transition from Sales to Implementation
    - o Solacom/Airbus Quote

- o   Initial PSAP design
- o   PSAP Physical Network Configuration
- o   Initial Design Sign Off
- o   Assign Project Team
- **Client Kickoff and Initial Planning**
  - o   Client Kickoff Meeting
  - o   Site Survey
  - o   Site Survey Questionnaire Received
  - o   Call Flow Review
  - o   PSD Recieved/Call Flow Documented
- **Order Placement Connectivity- Host Controller's to PSAP (PSAP's)**
  - o   Fiber NID install Test Turn-up
  - o   Secondary Connection Order
  - o   Backup Site Connection order
  - o   Point to Point Between
  - o   Test and soak
- **Network Traffic Migration**
  - o   Confirm Network Readiness
  - o   Review Confirm 911 Transfer Route's
- **LNG (audio codes - if required)**
  - o   LNG received
  - o   LNG configured, installed, and initial testing
- **Database (if required)**
  - o   TN Load Requested
  - o   Received TN Load
  - o   Database Ready
- **Equipment Ordering/Delivery**
  - o   VESTA Equipment Ordered
  - o   VESTA Equipment Delivery
  - o   Miscellaneous Equipment Ordered/Pulled from Stock
- **Provisioning/Staging**
  - o   911 Transfer/Speed dial/ Data Collection
  - o   Configure & Document Hosted controller Configuration
  - o   Configure TIG Server (MEVO Backup Services)
  - o   Configure TIG Server (PBX/Admin Integration Services)
  - o   Configure TIG Server (IP Phones)
  - o   Enter Speed Dial Data 911 Local Resources MEVO
  - o   MCK (Mobile Command Kit)
  - o   IMEI for the 4G router
  - o   AT&T Wireless SIM Cards
  - o   Setup and Test
- **Data Collection IP Phones**
- **Identify/Reserve Training Room/Area (Training will be is Dispatch)**
- **Installation/On site Tasks**
  - o   Vendor Notification
  - o   Install Rack 7'
  - o   Configure Install Printer

- o Customer Provided Hardware (Headsets)
- o Cabling (4 Cables per position)
- **CAD/Mapping Integration**
  - o CAD/Mapping Application Install- Ready for Connectivity
  - o Pre-Cut review for CAD & Mapping connectivity
- **Radio Headset Integration**
  - o Radio Install - Ready for Headset Integration Testing
  - o Pre-Cut Testing Headset Radio integration/pre-testing)
  - o Pre-Cut Testing (TIG Admin Integration)
- **Recording - Connectivity**
  - o Recorder Ready for Connetivity
  - o Pre-Cut Testing Connectivity to recorder
  - o Pre-Cut Testing (TIG Admin Integration)
  - o Pre Cut -Workstation Install
  - o MCK Command(Mobile Command Kit) - Setup and test
- **Training**
  - o Training Room Set-up
  - o Review and finalize training schedule
  - o Provide customer sign-up sheet
  - o Customer sign-up sheet completed/returned
  - o Administration Training
  - o End User Workstation/IP Phones/MEVO
  - o Reports Training
  - o ToolKit- Train Supervisor access- and all that apply
- **PSAP toolkit Application**
  - o Document Tool kit credentials
  - o Setup Tool kit profile for PSAP
  - o Tool kit verified
- **Cut Into Service**
  - o Send Notification to QRC
  - o Create CPE Cut Plan
  - o Cut Plan Distribution
  - o Complete Install and cut into Service
  - o Cleanup and Turnover to Support
  - o Customer Acceptance

Vermont NG911
Service Level Agreement
9/25/2018

Section 1	Vermont NG911 System Service Events, Triggers and Service Response Expectations

<table>
<tr><td colspan="4">THE CONTRACTOR agrees that the following events, incidents, triggers and service response guidelines will be used in support of the operation of the Vermont NG911 system</td></tr>
<tr><td></td><td>Event Definition</td><td>Example Trigger Events</td><td>Service Response Process for Notification and Restoration</td></tr>
<tr>
<td>1. CRITICAL Vermont NG911 SYSTEM OR SERVICE OUTAGE or FAILURE

<i>THE CONTRACTOR may be required to work with other NG911system service providers or other third parties as directed by the BOARD and as may be necessary to support the resolution and restoration of NG911 services provided by THE CONTRACTOR during CRITICAL events.</i>

<i>Following any CRITICAL event or CRITICAL outage, THE BOARD will receive a preliminary root cause analysis of the event or outage within five business days and final conclusions within ten business days.</i></td>
<td><i>CRITICAL is defined to include events and incidents that result in the FAILURE of THE CONTRACTOR to deliver 911 calls or related data (NG911 media payloads) due to the FAILURE of system components or functional elements or network elements, including those related to software, hardware and human systems used to support the Vermont NG911 system and services provided by the CONTRACTOR:</i>

<i>A CRITCAL Trouble is defined as a condition in which a system or function, workflow or process problem results in:</i>
<i>•   The disruption or severe reduction of the ability of system or the users of the</i></td>
<td>• Failure to deliver 911 media payload to a primary PSAP or primary interconnection point, for any duration of time where the media payload CANNOT be immediately redirected to an alternate PSAP, default PSAP or alternate 911 interconnection point;
• Failure to deliver ALI or related supplemental data to PSAPs served by THE CONTRACTOR;
• Failure to deliver ANI/CBN to PSAPs served by THE CONTRACTOR; or
• Failure to deliver 911 media payloads to more than three (3) PSAPs simultaneously</td>
<td>THE CONTRACTOR will abide by the following service response times and procedures during CRITICAL outage or failure events and incidents:
• 1st Level Support – Within 15 minutes of the detection or report of the event or incident.
  o Notification of the Board or its technical agent in accordance with the standards established by the FCC in order 13-158 is mandatory
• Continuous problem resolution/workaround effort
  o Status updates and progress reports are provided to the Board until NG911 service restoration
  o NG911 service restoration is the key priority during any CRITICAL event</td>
</tr>
</table>

	Event Definition	Example Trigger Events	Service Response Process for Notification and Restoration

	system to process 911 calls or properly, route 911 call traffic under normal conditions or manage and monitor emergency communications operations. The measure of the disruption or reduction is defined by the PSAP or the State.
	• The loss of redundancy due to a fault or disruption that the loss of any surviving component would cause a significant outage.
	• The complete loss of an NGCS, NG functional element or server that would amount to a decrease below the 99.999 availability metric
			• 2nd Level Support – within 30 minutes
			  o Notification of the Board is mandatory
			• 3rd Level Support – within 2 Hours or upon BOARD request.
			  o Notification of the Board is mandatory

2. **MAJOR NG911 SYSTEM OR SERVICE - SERVICE EFFECTING** THE CONTRACTOR may be required to work with other 911 system service providers or other third parties as directed by the BOARD and as may be necessary to support the resolution and restoration of NG911 services provided by THE CONTRACTOR during MAJOR events.	**MAJOR** events or incidents are defined as the **DEGRADATION** of capability of THE CONTRACTOR which impacts the ability to deliver NG911 media payloads and requires the use of designated backup/alternate routing/systems to deliver	• *One (1) or more NG911 core data centers, aggregation points or interconnection points are out of service or have service affecting impairments;* • ***DEGRADATION** in the delivery of 911 media payloads to a primary PSAP or 911*	• 1st Level Support – Within 15 minutes of the detection or report of the event or incident. o Notification of the Board or its technical agent in accordance with the standards established by the FCC in order 13-158 is mandatory o Status updates and progress reports are provided to the Board until NG911 service is restored to normal operations

	Event Definition	Example Trigger Events	Service Response Process for Notification and Restoration
	the NG911 payloads to the designated Vermont PSAP or 911 interconnection point. *A **MAJOR** Trouble is defined as condition in which a system or function is significantly affected but operational on backup or alternate systems.*	*interconnection point for any duration, where the payloads can be immediately redirected to an alternate PSAP or default PSAP or alternate 911 interconnection point* • **DEGRADATION** *in the delivery of ANI/CBN or supplemental information to a PSAP served by THE CONTRACTOR* **DEGRADATION** *in the delivery of ALI or other related 911 data to a PSAP served by THE CONTRACTOR or to a 911 interconnection point* *The automatic rerouting of traffic from the primary route for an extended period of time with no intervention or notification by the Vendor, PSAP or State.* *The intermittent disruption of an NGCS, functional element or PSAP.*	o Restoring NG911 service to normal operation is the key priority during any MAJOR event • 2nd Level Support – Within 4 Hours o Notification of the Board is mandatory • 3rd Level Support – Within 24 Hours or upon Customer request. • THE CONTRACTOR may be required to work with other NG911 system service providers or other third parties as directed by the BOARD and as may be necessary to support the resolution and restoration of Vermont NG911 services provided by THE CONTRACTOR during MAJOR events.

	Event Definition	Example Trigger Events	Service Response Process for Notification and Restoration
3. MINOR NG911 SYSTEM NON-SERVICE EFFECTING	*Events or incidents that result in THE CONTRACTOR providing services using alternate systems or services that do not impact or result in the FAILURE OR DEGRADATION of the delivery of 911 calls or related media payload data to the designated PSAP or require routing to an alternate PSAP.* *A Minor Trouble is defined as any problem not classified as Critical or Major.*		• *1st Level Support – Within 30 minutes* • *2nd Level Support – Within 1 business day* • *3rd Level Support - Within 1 week or upon Customer request.*
4. PLANNED MAINTENANCE/INFORMATIONAL – SOFTWARE UPDATE/CONFIGURATION			• *As defined by change management process.* • *Service Credit Penalties may apply.*

THE CONTRACTOR agrees that the following events, incidents, triggers and service response guidelines will be used in support of the operation of the Vermont NG911 system

Section 2	Vermont NG911 Service Availability and Time-to-Restore Expectations

Any and all metrics associated with the operation of the Vermont NG911 system and services will be measured by system availability. All NG911 services provided by the CONTRACTOR will be measured against the following criteria. Any adjustments or penalties resulting from any failure of the vendor to meet the service level agreements established herein will be determined based on the measurement of system/service availability and Time-to-Restore any critical systems or services to operation.

Service	Service Definition	Expected Service Level	Service Failure	Restoration Priority
NG911 Service Availability/Time-to-Restore Service Level Agreement The Vermont NG911 System and Service availability requirements are defined by both Functional and Non-Functional Requirements as established in the **State of Vermont RFP for Next Generation 911 System,** and in the State of Vermont Bidder Response Form (Exhibit C) and Bidder-Response-Final.xlsx **(03/30/2018)**	The Vermont NG911 System availability is directly impacted by the time taken to restore critical services back to normal operation. Time to Restore a service is measured from by data contained in the system log files.	The Vermont NG911 System and Services operates and is available 99.999% of the time, 7 days a week, 24 hours a day and 365 days a year.	Any Vermont NG911 Systems and Services provided by THE CONTACTOR that experiences a **CRITICAL** or **MAJOR** event (as defined above) or that fails to meet the service requirements establish in the RFP and which directly impacts the Vermont NG911 service availability will result in adjustments to the monthly recurring service costs paid by THE BOARD to THE CONTRACTOR per the table below	*Highest Priority - restore service availability and normal operation*

Section 2.1	Vermont NG911 System Service Credits Guidelines

It is the expectation of the BOARD that **The Vermont NG911 System and Services operates and is available 99.999% of the time, 7 days a week, 24 hours a day and 365 days a year.** Failure to meet service availability requirements may result in the application of Service Credit Penalties until service levels are restored to normal operations/expectations of the BOARD. Outages or failures of NG911 call processing or interruption of PSAP operations due to CRITICAL NG911 system or service failures will result in System Service Credits as follows.

Service Availability/Time to Restore SLA Credit Table			
System Service Events	**Time to Restore - Less than**	**Measurement of outage or failure of the NG911 System or Service**	**Service Credit Penalties**
Critical	**5 minutes**	**The duration of the critical NG911 system/service event will be determined by data contained in the system log files.**	**50% of Billed Monthly Recurring Charges. An additional 3% of Billed Monthly Recurring Charges will be added for every Time to Restore interval that is not met after the initial Time to Restore has elapsed.**
Major	**6 hours**	**The duration of the major NG911 system/service event will be determined by data contained in the system log files.**	**10% of Billed Monthly Recurring Charges. An additional 3% of Billed Monthly Recurring Charges will be added for every Time to Restore interval that is not met after the initial Time to Restore has elapsed.**
Minor	**72 hours**	**The duration of the critical NG911 system/service event will be determined by data contained in the system log files.**	**5% of Billed Monthly Recurring Charges. An additional 3% of Billed Monthly Recurring Charges will be added for every Time to Restore interval that is not met after the initial Time to Restore has elapsed.**

Section 2.2   Vermont NG911 System and Service Definitions

The following table establishes the CONTRACTOR provided services, service expectations and service levels of the Vermont NG911 system.

Service	Service Definition	Expected Service Level	Service Failure	Restoration Priority
Vermont NG911 System and Services				
The Vermont NG911 System and Services The Vermont NG911 System and Service requirements are defined by both Functional and Non-Functional Requirements as established in the **State of Vermont RFP for Next Generation 911 System,** and in the State of Vermont Bidder Response Form (Exhibit C) and Bidder-Response-Final.xlsx **(03/30/2018)** THE CONTRACTOR will provide NG911 services to those PSAPs, counties or connection points as required or directed to ensure public safety in Vermont. Connection points may be within and external to Vermont and are made at the discretion of THE BOARD.	The Vermont NG911 system includes the following services 1. NG911 Emergency Services IP Network Services (ESINET) 2. NG911 Core Services (NGCS) 3. NG911 PSAP Call Processing Services 4. NG911 System Security Services 5. NG911 Data and Reporting Services 6. NG911 Service Management, Maintenance and Support Services	The Vermont NG911 System and Services operates and is available 99.999% of the time, 7 days a week, 24 hours a day and 365 days a year.	Any Vermont NG911 Systems and Services provided by THE CONTACTOR that experiences a CRITICAL or MAJOR event (as defined in this SLA) or that fails to meet the service requirements establish in the RFP will result in adjustments to the monthly recurring service costs paid by THE BOARD to THE CONTRACTOR	*Highest Priority - restore to normal operation* *Service Response and Notification processes established in Section 1 will apply* *Service Credit Penalties established in Section 2.1 will apply*

Service	Service Definition	Expected Service Level	Service Failure	Restoration Priority
THE CONTRACTOR will operate an NG911 system that interconnects and interoperates with other Originating Service Providers, third party data providers and other 911 System Service Providers or systems that are integral to the operation of the entire Vermont NG911 system. The planning, deployment, implementation, operation, testing and maintenance of any NG911 systems and services provided by THE CONTRACTOR and used by the Vermont NG911 System are reportable to THE BOARD. Any new NG911 services or functions will require approval of THE BOARD at either the planning stage, the implementation stage, or refinements to the operational stage of the NG911 service. Any CONTRACTOR provided services or use of the Vermont NG911 Systems and Services not covered by the Agreement or anticipated by the RFP will be approved and implemented				

Service	Service Definition	Expected Service Level	Service Failure	Restoration Priority
at the discretion of THE BOARD and governed by the Agreement between the parties. Any changes to monthly recurring service costs resulting from new, additional or refined NG911 systems, platforms or services provided by THE CONTRACTOR as directed and approved by THE BOARD will be governed by THE CONTRACTOR service pricing submitted during contract negotiations and incorporated by reference (COST PROPOSAL REF).				
Vermont NG911 Emergency Services IP Network Services (ESINET)				
Vermont NG911 Emergency Services IP Network Services (ESINET) The Vermont NG911 System and Service requirements are defined by both Functional and Non-Functional Requirements as established in the **State of Vermont RFP for Next Generation 911 System,** and in the State of Vermont Bidder Response Form (Exhibit C) and	THE CONTRACTOR will provide ESINET infrastructure services to those PSAPs, counties or connection points as directed to ensure public safety. Connection points may be within and external to Vermont and are made at the discretion of THE BOARD. THE CONTRACTOR will operate an ESINET that interconnects and interoperates with other	The Vermont NG911 ESINET System and Services operates and is available 99.999% of the time, 7 days a week, 24 hours a day and 365 days a year.	Any Vermont NG911 ESINET systems and service provided by THE CONTACTOR that experiences a CRITICAL or MAJOR event (as defined in this SLA) or that fails to meet the service requirements establish in the RFP will result in adjustments to the monthly recurring service	*Highest Priority - restore to normal operation* *Service Response and Notification processes established in Section 1 will apply* *Service Credit Penalties established in Section 2.1 will apply*

Service	Service Definition	Expected Service Level	Service Failure	Restoration Priority
Bidder-Response-Final.xlsx *(03/30/2018)*	Originating Service Providers, third party providers and 911 System Service Providers or systems that are integral to the operation of the Vermont NG911 system.		costs paid by THE BOARD to THE CONTRACTOR	
Vermont NG911 Core Services (NGCS)				
Vermont NG911 Core Services (NGCS) The Vermont NG911 System and Service requirements are defined by both Functional and Non-Functional Requirements as established in the ***State of Vermont RFP for Next Generation 911 System,*** and in the State of Vermont Bidder Response Form (Exhibit C) and Bidder-Response-Final.xlsx *(03/30/2018)*	Includes the provisioning and operation of the following NG911 functional elements • Location Validation Function (LVF), • Location Information Service (LIS) • Emergency Services Routing Proxy (ESRP) • Emergency Call Routing Function (ECRF) • Border Control Functions (BCF) • NGCS Logging and Reporting	The Vermont NG911 NGCS System and Services operates and is available 99.999% of the time, 7 days a week, 24 hours a day and 365 days a year.	Any Vermont NG911 NGCS systems and service provided by THE CONTACTOR that experiences a CRITICAL or MAJOR event (as defined in this SLA) or that fails to meet the service requirements defined in the RFP will result in adjustments to the monthly recurring service costs paid by THE BOARD to THE CONTRACTOR	*Highest Priority - restore to normal operation* *Service Response and Notification processes established in Section 1 will apply* *Service Credit Penalties established in Section 2.1 will apply*
Vermont NG911 PSAP Call Processing System and Services (Hosted CPE)				
Vermont NG911 PSAP Call Processing System and Services The Vermont NG911 System and Service requirements are defined by both Functional	The successful routing and delivery of all emergency traffic received and processed by the Vermont NG911 Call Processing system measured in any given calendar month when delivered to its correct PSAP destination	The Vermont NG911 PSAP Call Processing System and Services operates and is available 99.999% of the time, 7 days a week, 24 hours a day and 365 days a year.	Any Vermont NG911 PSAP Call Processing systems and service provided by THE CONTACTOR that experiences a CRITICAL or MAJOR event (as defined in this SLA) or that fails to	*Highest Priority - restore to normal operation* *Service Response and Notification processes established in Section 1 will apply*

Service	Service Definition	Expected Service Level	Service Failure	Restoration Priority
and Non-Functional Requirements as established in the *State of Vermont RFP for Next Generation 911 System,* and in the State of Vermont Bidder Response Form (Exhibit C) and Bidder-Response-Final.xlsx *(03/30/2018)*			meet the service requirements defined in the RFP will result in adjustments to the monthly recurring service costs paid by THE BOARD to THE CONTRACTOR	*Service Credit Penalties established in Section 2.1 will apply*
Vermont NG911 Voice Quality Services				
NG911 Voice Quality Services The Vermont NG911 System and Service requirements are defined by both Functional and Non-Functional Requirements as established in the *State of Vermont RFP for Next Generation 911 System,* and in the State of Vermont Bidder Response Form (Exhibit C) and Bidder-Response-Final.xlsx *(03/30/2018)*	The performance objective for Voice Quality SLA is for the Daily Predicted MOS (PMOS) value per PSAP to be 3.5 or more for G.711 codec as measured by the system, where the ideal PMOS score for the G.711 codec is 4.3. The Service will monitor the IP audio packets from Aggregation sites (from the NG911 ESInet demarcation point) into the Core Call Processing Nodes and from the PSAP (from the Customer demarcation point) into the Core Call Processing Nodes.	The Vermont NG911 System Voice Quality Service operates and is available 99.999% of the time, 7 days a week, 24 hours a day and 365 days a year.	Any Vermont NG911 Voice Quality impacting systems and service provided by THE CONTACTOR that experiences a CRITICAL or MAJOR event (as defined in this SLA) or that fails to meet the service requirements of the RFP will result in adjustments to the monthly recurring service costs paid by THE BOARD to THE CONTRACTOR The Daily PSAP PMOS value will be based on an average of the per call PMOS scores over a 24-hour calendar day.	*Highest Priority - restore to normal operation* *Service Response and Notification processes established in Section 1 will apply* *Service Credit Penalties established in Section 2.1 will apply*

Service	Service Definition	Expected Service Level	Service Failure	Restoration Priority
			If vendor does not meet this performance objective and the Voice Quality SLA falls below the performance objective for three consecutive days in a given calendar month and vendor is unable to restore Service to meet the performance objective within 30 days of the failure,	
Vermont NG911 System Security Services				
Vermont NG911 System Security Services The Vermont NG911 System and Service requirements are defined by both Functional and Non-Functional Requirements as established in the ***State of Vermont RFP for Next Generation 911 System,*** and in the State of Vermont Bidder Response Form (Exhibit C) and Bidder-Response-Final.xlsx ***(03/30/2018)***	THE CONTRACTOR will provide security services and the industry standards compliant systems necessary to support the secure operation of the Vermont NG911 system.	The Vermont NG911 System Security Services operates and is available 99.999% of the time, 7 days a week, 24 hours a day and 365 days a year.	Any Vermont NG911 System Security Service provided by THE CONTACTOR that experiences a CRITICAL or MAJOR event (as defined in this SLA) or that fails to meet the service requirements defined in the RFP will result in adjustments to the monthly recurring service costs paid by THE BOARD to THE CONTRACTOR	*Highest Priority - restore to normal operation* *Service Response and Notification processes established in Section 1 will apply* *Service Credit Penalties established in Section 2.1 will apply*
Vermont NG911 Data and Reporting Services				
NG911 Data and Reporting Services	THE CONTRACTOR will provide data, reporting, recording and	The Vermont NG911 Data and Reporting	Any Vermont NG911 Data and Reporting Services	*Highest Priority - restore to normal operation*

VT NG911 SLA Template

Service	Service Definition	Expected Service Level	Service Failure	Restoration Priority
The Vermont NG911 System and Service requirements are defined by both Functional and Non-Functional Requirements as established in the **State of Vermont RFP for Next Generation 911 System,** and in the State of Vermont Bidder Response Form (Exhibit C) and Bidder-Response-Final.xlsx **(03/30/2018)**	logging for all THE CONTRACTOR systems and services supporting the operation of the Vermont NG911 system. GIS and mapping data services Legacy/Transitional ALI services Third party data providers Types of reporting expected by the board • VTNG911 related traffic volumes and capacities • VTNG911 transaction totals, aggregates, accumulations • VTNG911 transaction categorizations, types, groupings • VTNG911 operations expected vs unexpected • VTNG911 network inbound and outbound transactions • VTNG911 traffic originations, transfers and deliveries • VTNG911 service events, incidents, outages, interruptions, failures	Services operates and is available 99.999% of the time, 7 days a week, 24 hours a day and 365 days a year.	provided by THE CONTACTOR that experiences a CRITICAL or MAJOR event (as defined in this SLA) or that fails to meet the service requirements defined in the RFP will result in adjustments to the monthly recurring service costs paid by THE BOARD to THE CONTRACTOR	*Service Response and Notification processes established in Section 1 will apply* *Service Credit Penalties established in Section 2.1 will apply*

Service	Service Definition	Expected Service Level	Service Failure	Restoration Priority
	• VTNG911 scheduled and unscheduled maintenance • VTNG911 system and component testing • VTNG911 Trouble/Service tickets and issue resolution • VTNG911 service and system status reports • VTNG911 Multi-level reporting including: PSAP, County or Statewide level. • Ability to export VTNG911 reports in PDF, HTML, CVS and Excel formats			
Vermont NG911 Service Management, Maintenance and Support Services				
NG911 Service Management, Maintenance and Support Services The Vermont NG911 System and Service requirements are defined by both Functional and Non-Functional Requirements as established in the ***State of Vermont RFP for Next Generation 911 System,*** and in	THE CONTRACTOR will utilize staff and system resources familiar with and dedicated to the operation of all THE CONTRACTOR provided Vermont NG911 services. THE CONTRACTOR provided helpdesk services will be primary	The Vermont NG911 Service Management, Maintenance and Support Services operates and is available 99.999% of the time, 7 days a week, 24 hours a day and 365 days a year.	Any Vermont NG911 Service Management, Maintenance and Support Services provided by THE CONTACTOR that experiences a CRITICAL or MAJOR event (as defined in this SLA) or that fails to meet the service requirements defined in	*Highest Priority - restore to normal operation* *Service Response and Notification processes established in Section 1 will apply*

Service	Service Definition	Expected Service Level	Service Failure	Restoration Priority
the State of Vermont Bidder Response Form (Exhibit C) and Bidder-Response-Final.xlsx *(03/30/2018)*	for ALL served PSAPs in Vermont or as directed by THE BOARD. THE CONTRACTOR will operate a 24x7x365 Help Desk for the Vermont NG911 system. THE CONTRACTOR will operate a 24x7x365 Network Operations Center (NOC) for the Vermont NG911 system.		the RFP will result in adjustments to the monthly recurring service costs paid by THE BOARD to THE CONTRACTOR	*Service Credit Penalties established in Section 2.1 will apply*