PSAP Grant Committee Meeting

May 14, 2019

Agenda

- Call Meeting to Order
- Minutes from February 19, 2019 Meeting
- FY21 Draft PSAP Grant Guidelines
- NG9-1-1 Funding Requests
- Grant Extension Requests
- NG9-1-1 Deployment Update
- Old Business
- New Business
- PGC Report to Board
- Public Comment and Closing

FY21 Draft PSAP Grant Guidelines

NG9-1-1 Funding Requests

Latest Round of Funding Requests

PSAP	Primary Selective Router Regions	Amount Requested
Amelia	Chester/Stuart	$300,550.90
Bath	Other	$183,544.44
Craig	Other	$241,566.74
Danville	Danville/Lynchburg	$372,784.06
Hopewell	Chester/Stuart	$327,007.19
King William	Chester/Stuart	$905,744.17
Mecklenburg	Chester/Stuart	$1,276,275.88
Northumberland	Chester/Stuart	$1,240,058.38
Portsmouth	High Street/Jefferson	$428,737.63
Rappahannock	Charlottesville/Farmville	$769,981.10
Sussex	Chester/Stuart	$1,777,307.71
Winchester	Fredericksburg/Winchester	$568,883.12

Grant Extension Requests

FY18 Grant Extension Requests

- Arlington #079 - (6/30/2020) – Shared CHE

- Charlotte #087 - (9/30/2019) – CAD

- Halifax #082 - (12/31/2019) – NG9-1-1 GIS

- Norfolk #158 - (10/31/2019) – Individual CHE

- Tazewell #152 - (12/31/2019) – Shared NG9-1-1 GIS

NG9-1-1 Deployment Update

New Developments

- Fairfax - transition FY17 grant #35 to MPs

- Vesta 7.2 release

- NG9-1-1 contract extensions:
  - RAA
  - Giles
  - Middlesex

- NG9-1-1 funding requests:
  - Progress reports
  - Amendment process

Old Business

New Business

New Business

- Martinsville-Henry County, Patrick County and Franklin County

  – Localities seek permission to accelerate CHE upgrade so all three localities can be aligned for a single shared solution

- Travel Assistance - Per Diem Rate for the Spring NENA/APCO Conference

Conclusion

- Committee Report to the Board

- Public Comment

- Next Meeting Date – June 13, 2019

- Adjourn

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PGC Meeting Agenda
April 11, 2019 1:00 pm
Monroe Building, 16ᵗʰ Floor Conference Room

1. Call Meeting of the Committee to Order .... Chair

2. Approval of the Minutes from the February 19, 2019 Meeting .... Chair

3. FY21 Draft PSAP Grant Guidelines .... PSAP Grant Program Manager

4. NG9-1-1 Funding Requests...................................... PSAP Grant Program Manager

5. Grant Extension Requests .... PSAP Grant Program Manager

6. NG9-1-1 Deployment Update .... PSC Coordinator

7. Old Business

8. New Business

9. PGC Report to the Board .... PSC Coordinator

10. Public Comment .... Chair

11. Adjourn Meeting of the Committee .... Chair

Next Meeting – June 13, 2019

PSAP Grant Committee Meeting
May 14th, 2019 1:00PM

Committee Members in Attendance

J. R. Powell   Chris Caldwell   Katie Boone   Steve McMurrer

Stephen Williams

Staff in Attendance

Dorothy Spears-Dean   Stefanie McGuffin   Steve Marzolf

Lewis Cassada   Lisa Nicholson

1) **Call Meeting to Order**

   The PSAP Grant Committee Meeting was called to order at 1:00PM by Mr. McMurrer.

2) **Approval of the February 19th Minutes**

   Mr. McMurrer called for a motion to approve the February 19th Meeting Minutes. Mr. Powell made the motion to approve, and it was seconded by Ms. Boone. The motion passed 5-0-0.

3) **FY21 Draft PSAP Grant Guidelines**

   Ms. Spears-Dean reviewed the [FY21 Draft PSAP Grant Guidelines](#). Due to legislative changes, 40% of the Fund is now dedicated to the Grant Program. The payment request process is now outlined in all Grant Program documents. Ms. Spears-Dean reviewed the Migration Proposal and Proposal Acceptance Letter process from last year. The PSAP Grant amendment process and progress report process will be discussed under New Business. Ms. Nicholson reviewed additional updates in the draft Guidelines. Mr. Marzolf asked for Committee input if anything didn't appear to be clear. There was Staff/Committee discussion. Ms. Nicholson asked to create sample forms to be posted to the ISP website. Ms. Spears-Dean reviewed the Text-to-9-1-1 Program for the Committee. Mr.

McMurrer called for a motion to recommend to the Board approval of the FY21 Draft Grant Guidelines. Mr. Williams made the motion, and Mr. Powell seconded it. The motion passed 5-0-0.

4) **NG9-1-1 Funding Requests**

Ms. Nicholson reviewed the current round of NG9-1-1 funding requests that had been posted to the ISP website. They were from the localities of Amelia, Bath, Craig, Danville, Hopewell, King William, Mecklenburg, Northumberland, Portsmouth, Rappahannock, Sussex, and Winchester. Mr. McMurrer called for a motion to approve the funding requests as presented. Mr. Caldwell made the motion, and Ms. Boone seconded it. The motion passed 5-0-0.

5) **Grant Extension Requests**

Ms. Nicholson reviewed five grant extension requests. They were from the localities of Arlington, Charlotte, Halifax, Norfolk, and Tazewell. Mr. McMurrer called for a motion to recommend to the Board approval of the grant extension requests as presented. Mr. Powell made the motion and it was seconded by Mr. Williams. The motion passed 5-0-0.

6) **NG9-1-1 Deployment Update**

Ms. Spears-Dean reviewed various NG9-1-1 deployment developments. The first was the progress of the 7.2 Vesta release. Once all issues are addressed it will be a 10-12 week testing program to finalize the update. Motorola/AT&T will be updating Staff regularly as the update progresses. Due to the 7.2 delay, a FY17 grant is set to expire. Staff intends to transition to those funds into a Migration Proposal. Mr. McMurrer said they might be able to expend some of the FY17 funds, but he didn't expect if to cover the entire amount by June 30th. Ms. Spear-Dean reviewed three NG9-1-1 contract extension requests for the Richmond Ambulance Authority, Giles, and Middlesex. Staff recommends giving Giles and Middlesex an additional 90 days. (This is an informal process). Consensus was to allow the additional 90 days for their contract execution. Ms.

Spears-Den also covered the Progress Reports and Amendment process for NG9-1-1 funding. Current 2019 and future 2020 timelines were discussed.

7) **Old Business**

Ms. Nicholson let the Committee know that VITA Finance approved an amount of $112 per attendee for the NENA Spring conference. Mr. McMurrer called for a motion for the Committee to recommend to the Board the $112 rate. Ms. Boone made the motion and Mr. Caldwell seconded it. The motion passed 5-0-0.

8) **New Business**

Mr. Powell presented to the Committee the CHE upgrade schedule for Martinsville-Henry, Patrick, and Franklin counties. The localities are seeking permission to accelerate the CHE upgrade so that all three localities can be aligned for a single shared solution. There was Staff/Committee discussion. The consensus of the Committee is that this should be allowed

9) **Report to the Board**

Ms. Spears-Dean listed the items to be presented to the 9-1-1 Services Board. They were the FY21 PSAP Grant Guidelines, grant extension requests, funding requests, and the $112 travel assistance rate.

10)   **Public Comments**

Ms. Jolena commented on text-to-9-1-1 charges on the PAL, and the text-to-9-1-1 legislative window. Ms. Young also commented on the activities of the Sustainable Funding Committee.

11)   **Next Meeting Date**

The next meeting date of the PSAP Grant Committee is June 13th.

12)   **Adjourn**

The meeting of the PSAP Grant Committee adjourned at 2:00PM.

Commonwealth of Virginia
Next Generation 9-1-1

City of Winchester
PSAP/GIS Specific
NG9-1-1 Migration Proposal

Executive Summary

This migration proposal is being prepared for the **City of Winchester PSAP** based on the Fairfax County contract with **AT&T**. **Erin Malloy** shall be the primary contact.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A Migration Proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the **City of Winchester** PSAP will need to upgrade their current Vesta 911 software or have in place an i3 functional CHE that has been approved on the AT&T ESInet™ to be able to implement the full NENA i3 standard without the need for any interim or transitional steps. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at: https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: **Motorola**
- CHE model: **Vesta 911**
- CHE version number (clients): **6.1**
- CHE version number (server): **6.1**
- CHE maintenance provider (channel): **Carousel Industries**
- CHE Geodiversity: **No**
- Number of positions: **5**
- SIP capable: **Yes**

This CHE has been determined to be SIP capable, but will require an upgrade to version 7.2 to implement the full i3 interface. This upgrade from version 6.1 should be at no cost, but will require the purchase of two firewalls to connect to the ESInet. However, if the PSAP deploys text to 9-1-1 with the integrated solution prior to NG9-1-1 migration, these firewalls will already have been purchased and can be used for both purposes.

The PSAP reports plans to replace their CHE in **April 2020**. If their current equipment is not certified by that time, the new CHE must be i3 capable and should be tested to be connected to the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. **City of Winchester** has not deployed text to 9-1-1, however, they currently have a grant to implement text to 9-1-1.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: **Shield Technology Corp.**
- CAD software version: **7.1.6**
- CAD interfaces: **Yes**
- Method of data transfer: **Serial**

This CAD system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: **Geocomm**
- Dispatch Mapping Software Version: **GeoLynx 8.19.1**
- Method of data transfer: **Serial**

This mapping display system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: **NICE**
- Logging Recorder Model:
- Logging Recorder Software Version: **6.1.0.158**
- Audio Origination Point: **Both trunks and positions**

It is important to note that with an IP connection, audio is not present on the circuit until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio message is played for the caller (which technically requires the CHE to answer the call to play the message). This voice logging recorder system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Data Analytics

Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: **ECaTS**
- Data Analytics Vendor: **ECaTS**

All required upgrades to ECaTS will be handled through the statewide contract at no cost to the PSAP.

Outcall Notification Systems

The PSAP currently does not have an outcall notification system. If one is implemented, AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications

No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space

The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP indicates that rack space is currently available.

Coordination with Open Grants

The PSAP currently has one open grant:

1. **FY19 – CHE - Text to 9-1-1 – $150,000**

GIS Data Preparation

GIS Data Sources

Currently, **City of Winchester GIS** maintains all of the GIS data for the PSAP and will be the source for all GIS data required for NG9-1-1 geospatial routing; however, other departments within the locality may contribute data or manage various processes. It is the responsibility of **City of Winchester GIS** to aggregate the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness

Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met, the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is recommending the additional goal of matching 98% of ALI database addresses when geocoded against the address point data layer. If either of these goals in not achieved, then GIS data work must be completed to meet or exceed these goals. While financial support from the PSAP grant program may be

available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline (RCL) – **98.2%**
- Address Point – **99.4%**

Winchester County already meets both goals. If they desire a greater match rate, there are some differences in street names between the ALI and GIS data. Correcting the street names so they match would increase the match rate for RCL to **98.7%.** The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to **99.7%.** During July 2018, VITA will send each PSAP and/or GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place:

1. **Add a record to the GIS** – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. **Change attribution in the GIS** – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.
3. **Change attribution in the ALI database** – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.
4. **Determine that the discrepancy is not an error** – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While many of those records were filtered out of the analysis, some may still be within the data. These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty when

routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in two or more matches. Since certainty of a location is important, checks are performed to ensure no duplicate data exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - **0**
- Road centerline has right or left side overlapping address range - **4**
- Road centerline has street name attributes not meeting Virginia, USPS, & NENA standard - **17**
- Address point Is duplicate, has no street name, or no address number - **13**
- Address point street name and road centerline street name mismatch - **0**

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Regardless of how they are resolved, **City of Winchester** will need to resolve these issues through internal resources, at least 3 months prior to the targeted deployment date.

PSAP Boundary

This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary

This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Edge-matching conformance addresses boundaries between GIS sources within a PSAP and between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. GIS features need to meet at the agreed upon boundary for geometric continuity and attribute consistency.

MSAG transition/confirmation

In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is the end-state goal for full i3 implementation since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG, an emergency service number (ESN) data layer must exist or be created. The PSAP has **one ESN** for their area of responsibility. Since the **City of Winchester GIS** maintains an ESN boundary layer, they will utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not part of a locality's existing maintenance workflow or GIS database, they can be created by building a

separate polygon layer and transferring these values to the centerline segments (commonly referred to as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

GIS Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing GIS data to the AT&T Spatial Interface. Localities wishing to use existing internal tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to review and resolve error and discrepancy reports within the timeframe required by AT&T and periodically provide updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important localities document GIS data maintenance workflows to ensure maintenance activities engage all responsible entities. It is equally important to ensure GIS maintenance workflows and procedures are updated to be compatible with discrepancy management required to support NG9-1-1. NG9-1-1 will introduce additional maintenance issues such as periodically reviewing conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use, and the CHE is i3 capable.

The two interim solutions are as follows:

> **Legacy PSAP Gateway** - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

Transitional SIP - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: **Verizon**
- ALI database provider: **Verizon**
- Selective router pair(s): **Fredericksburg/Winchester**
- Trunk counts (all): **14**
    - Wireline: **4**
    - Wireless: **4**
    - SIP: **0**
    - Administrative: **6**

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be discussed with AT&T during system configuration. The options include providing the caller with a fast busy signal, routing the call to another PSAP, or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant connections follow different paths that never touch from origin to destination. To achieve the 99.999% availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP and the results for the primary location of the **City of Winchester** PSAP are as follows:
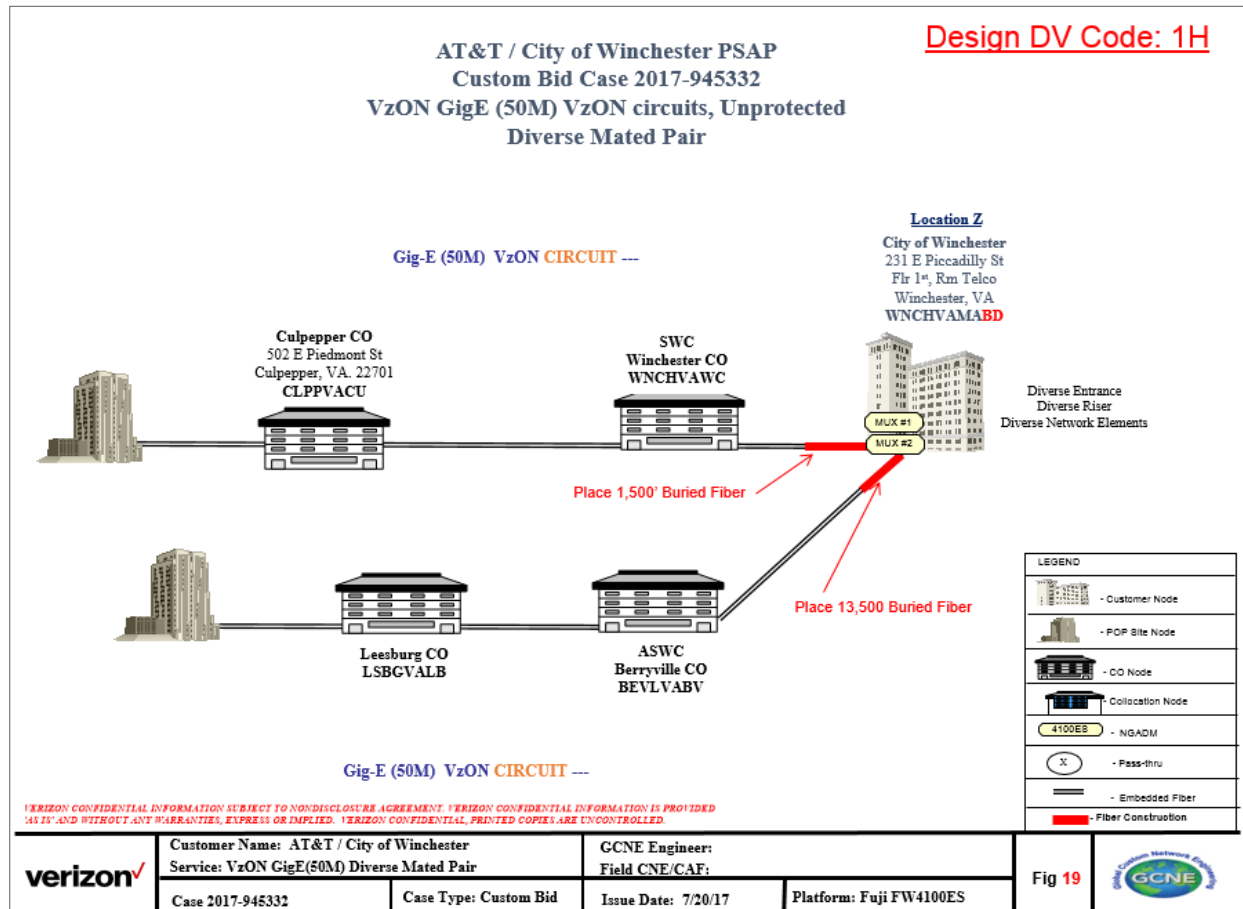
The total cost for diverse connectivity is **$305,949.00** which will be provided by the Board as part of the PSAP's funding submission. The timing of the implementation of the diverse connectivity may not be completed until after initial NG9-1-1 deployment.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP has a disaster recovery plan which states that if the PSAP must be evacuated for any reason or should just the 9-1-1 network be unavailable and the PSAP can still be occupied calls will roll over to the **Frederick County PSAP** or receive a fast busy signal.

Based on the current disaster recovery plan, no additional steps to be taken in order for this plan to continue to be viable with NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP
There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security
AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality
- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than

supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.
- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	Verizon	1,660,182	January 2020 – June 2020
Charlottesville/Farmville	CenturyLink	403,369	July 2020 – December 2020
Fredericksburg/Winchester	**Verizon**	**343,031**	**July 2020 – December 2020**
Danville/Lynchburg Church St	Verizon	320,247	July 2020 – December 2020
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	TDS Telecom	5,158	January 2021 – June 2021
Floyd County	Citizens	15,651	January 2021 – June 2021
Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021

| Johnson City/Wytheville | CenturyLink | 338,311 | July 2021 – December 2021 |

The **Winchester PSAP's** deployment window is **July 2020 – December 2020**. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least **three months** before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4000	Flat rate from AT&T; covered by grant
CHE upgrade	$30,000	i3 deployment services
CHE replacement	$150,000	Replacement in FY2020
Text-to-911	$0	Currently utilizing grant funds
CAD upgrade	$0	Not required
Mapping upgrade	$0	Not required
Voice logging upgrade	$0	Not required
ECaTS Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$0	Not required
Rack space	$0	Rack space is available
Diverse connectivity costs	$305,949.00	15K feet of fiber required
Disaster recovery upgrade	$0	Not required
Secondary PSAPs	$0	None
GIS data preparation	$0	Not required
Legacy 9-1-1 transition costs	$6,111.00	
Project management assistance	$0	None requested
Total	$497,060.00	

The monthly recurring cost for the AT&T solution is **$5,460.48** which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately **$2,467.85**. The estimated monthly increase to the PSAP after deployment is approximately **$2,992.63**. This increase will be covered by the Board for a period of 24 months after deployment is complete. At the end of this period, the entire cost will be the responsibility of the PSAP. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding

The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:

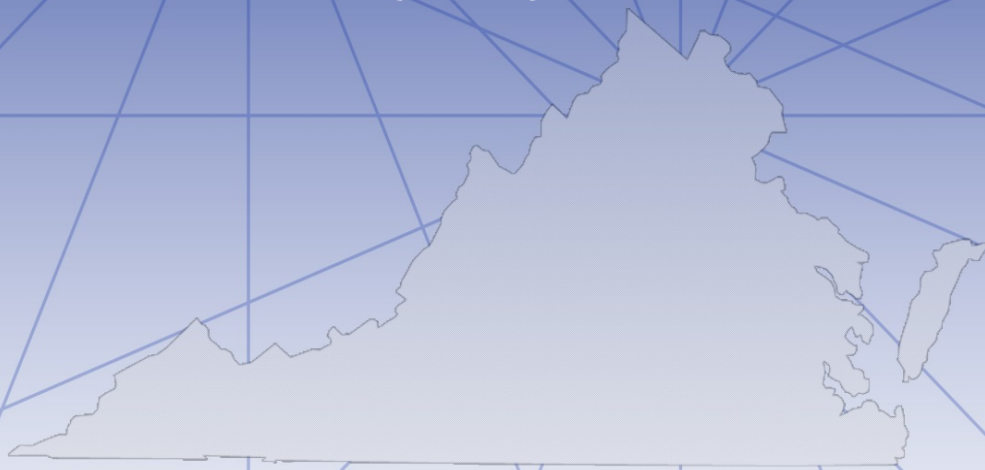| Type of Funding	Amount
Non-recurring	$497,060.00
Recurring (over 24 months)	$71,823.12
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Commonwealth of Virginia
Next Generation 9-1-1

Proposal Acceptance Letter
(PAL)

www.vita.virginia.gov

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program. Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: City of Winchester, Virginia

CONTACT TITLE: Director of Emergency Communications

CONTACT FIRST NAME: Erin

CONTACT LAST NAME: Malloy

ADDRESS 1: 231 E. Piccadilly Street

ADDRESS 2: Click here to enter text

CITY: Winchester

ZIP CODE: 22601

CONTACT EMAIL: Erin.Malloy@winchesterva.gov

CONTACT PHONE NUMBER: 540-545-4715

CONTACT MOBILE NUMBER: ~~540-662-4131~~ **540-336-6454** AO – per email 2/7/2019

CONTACT FAX NUMBER: ~~540-542-1314~~ **540-542-1312** AO – per email 2/7/2019

Financial Information

Amount Requested: $ 568,883.12

Date of Completed Migration Proposal: November 1, 2018

PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

Yes☐ Yes

Commonwealth of Virginia
Next Generation 9-1-1

Sussex County
PSAP/GIS Specific
NG9-1-1 Migration Proposal

www.vita.virginia.gov

Executive Summary

This migration proposal is being prepared for the **Sussex County PSAP** based on the Fairfax County contract with **AT&T**. **Vandy Jones** shall be the primary contacts.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A Migration Proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the **Sussex County PSAP** will need to have i3-capable call handling equipment in place that has been approved on the AT&T ESInet™ to be able to implement the full NENA i3 standard without the need for any interim or transitional steps. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at: https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: **Motorola**
- CHE model: **Vesta 911**
- CHE version number (clients): **6.1**
- CHE version number (server): **6.1**
- CHE maintenance provider (channel): **Carousel Industries**
- CHE Geodiversity: **No**
- Number of positions: **2**
- SIP capable: **Yes**

This CHE will need to be upgraded to Vesta 7.2 to implement the full i3 interface. This may require the purchase of firewall(s) to connect to the ESInet. However, if the PSAP deploys text to 9-1-1 with the direct IP solution prior to NG9-1-1 migration, these firewalls will already have been purchased and can be used for both purposes.

The PSAP indicates the planned replacement of their CHE in **October 2020**. This is after the planned NG9-1-1 migration. Any new CHE will need to be tested and i3 functional on the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. The PSAP has not yet deployed text to 9-1-1. Since their deployment for NG9-1-1 is scheduled before the new deadline for text to 9-1-1 deployment, they will deploy it with NG9-1-1 as a direct IP service integrated with their CHE. The cost to implement this will be covered by the Board.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: **DaPro**
- CAD software version: **IBR Plus v5.3.1**
- CAD interfaces: **Yes**
- Method of data transfer: **Serial**

While this CAD system has been determined to not require any upgrade or modification with the deployment of NG9-1-1, it will no longer be vendor supported as of April 2020. The PSAP will need to upgrade this system, but this is outside the scope of the NG9-1-1 migration.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: **GeoComm**
- Dispatch Mapping Software Version: **GeoLynx**
- Method of data transfer: **Serial**

This mapping display system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: **Exacom**
- Logging Recorder Model: **Hindsight G2**
- Logging Recorder Software Version:
- Audio Origination Point: **Trunks**

While the voice logging recorder system does not require any upgrade or modification with the deployment of NG9-1-1, if the PSAP wishes to maintain trunk-based recording, a span port will be provided by AT&T. The recording system may require an upgrade to receive and interpret the IP data. If desired, the cost of this upgrade would be covered by the Board. It is important to note that while this will allow audio to be pulled from the IP talk paths, it will not mirror current functionality. Currently, with analog trunks, trunk-based recording allows the audio to be captured before the call is answered by

the call taker and the call is still in queue. With an IP connection, the audio is not present on the circuit until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio message is played for the caller (which technically requires the CHE to answer the call to play the message). The PSAP can choose to convert to position-based recording and the Board will cover the cost of reconfiguration.

Data Analytics

Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: **ECaTS**
- Data Analytics Vendor: **ECaTS**

Outcall Notification Systems

The PSAP currently used does not have an outcall notification system. If one is put in place, AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications

No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space

The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP has confirmed that this space is currently or will be available.

Coordination with Open Grants

The PSAP currently has no open grants, as of April 1, 2018, that would impact NG9-1-1 deployment.

GIS Data Preparation

GIS Data Sources

Currently, **MSAG Data Consultants** maintains all of the GIS data for the PSAP and will be the source for all GIS data required for NG9-1-1 geospatial routing; however, other departments within the locality may contribute data or manage various processes. It is the responsibility of **MSAG Data Consultants** to aggregate the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness

Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met, the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is recommending the additional goal of matching 98% of ALI database addresses when geocoded against the address point data layer. If either of these goals in not achieved, then GIS data work must be

completed to meet or exceed these goals. While financial support from the PSAP grant program may be available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline (RCL) – **91.2%**
- Address Point – **85.6%**

The primary issue with the RCL data is differences in street names between the ALI and GIS data. Correcting the street names so they match would increase the match rate for RCL to **92.9%**. The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to **89.6%**. During July 2018, VITA will send each PSAP and/or GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place.:

1. **Add a record to the GIS** – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. **Change attribution in the GIS** – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.
3. **Change attribution in the ALI database** – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.
4. **Determine that the discrepancy is not an error** – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While many of those records were filtered out of the analysis, some may still be within the data. These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty when

routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in two or more matches. Since certainty of a location is important, checks are performed to ensure no duplicate data exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - **0**
- Road centerline has right or left side overlapping address range - **8**
- Road centerline has street name attributes not meeting Virginia, USPS, & NENA standard - **0**
- Address point Is duplicate, has no street name, or no address number - **42**
- Address point street name and road centerline street name mismatch - **12**

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Regardless of how they are resolved, **Sussex County** will need to resolve these issues through their data maintenance provider at least three months prior to the targeted deployment date.

PSAP Boundary
This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary
This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Edge-matching conformance addresses boundaries between GIS sources within a PSAP and between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. GIS features need to meet at the agreed upon boundary for geometric continuity and attribute consistency.

MSAG transition/confirmation
In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is the end-state goal for full i3 implementation since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG, an emergency service number (ESN) data layer must exist or be created. The PSAP has **one** ESN for their area of responsibility. **Sussex County** does not maintain an ESN boundary layer depicting this area. Since this layer is the same as the PSAP boundary layer, it will be created at the same time. Once it is, they can utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not

part of a locality's existing maintenance workflow or GIS database, they can be created by building a separate polygon layer and transferring these values to the centerline segments (commonly referred to as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

GIS Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing GIS data to the AT&T Spatial Interface. Localities wishing to use existing internal tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to review and resolve error and discrepancy reports within the timeframe required by AT&T and periodically provide updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important localities document GIS data maintenance workflows to ensure maintenance activities engage all responsible entities. It is equally important to ensure GIS maintenance workflows and procedures are updated to be compatible with discrepancy management required to support NG9-1-1. NG9-1-1 will introduce additional maintenance issues such as periodically reviewing conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use and the CHE is i3 capable.

The two interim solutions are as follows:

Legacy PSAP Gateway - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

Transitional SIP - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: **Verizon**
- ALI database provider: **Verizon**
- Selective router pair(s): **Chester/Richmond Stuart**
- Trunk counts (all): **10**
    - Wireline: **4**
    - Wireless: **4**
    - SIP: **0**
    - Administrative: **2**

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be discussed with AT&T during system configuration. The options include providing the caller with a fast busy signal, routing the call to another PSAP, or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant connections follow different paths that never touch from origin to destination. To achieve the 99.999% availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP and the results for the current location of the **Sussex County** PSAP are as follows:
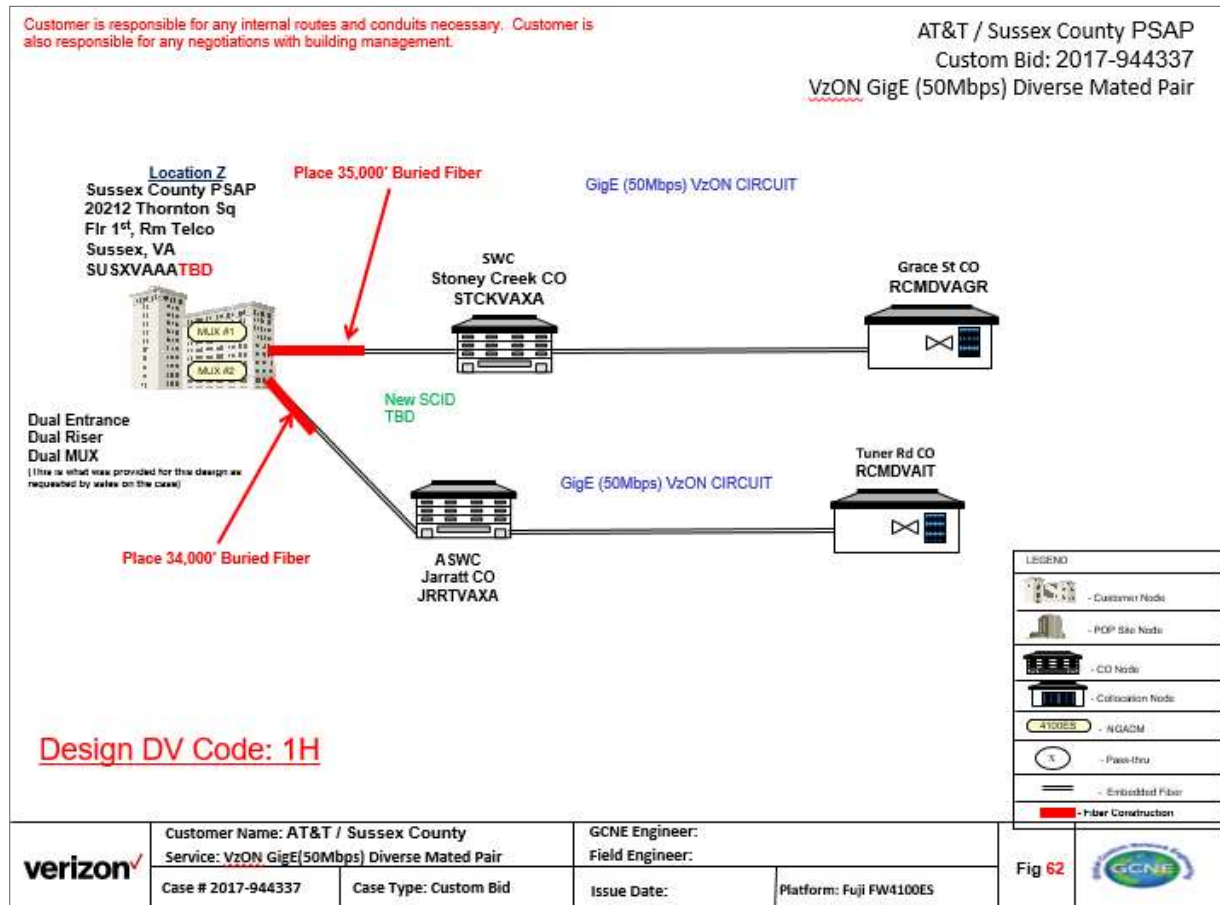
The total cost for this diverse connectivity is $**1,473,265.67** which will be provided by the Board as part of the PSAP's funding submission. The timing of the implementation of the diverse connectivity may not be completed until after initial NG9-1-1 deployment.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP has a disaster recovery plan. If the PSAP must be evacuated for any reason, calls are rerouted to a 10-digit number at the **Waverly Police Department**. If the 9-1-1 network is unavailable calls receive a fast busy signal.

Based on the current disaster recovery plan, no additional steps need to be taken in order for this plan to continue to be viable with NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP
There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security
AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality
- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than

supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.
- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	**Verizon**	**1,660,182**	**January 2020 – June 2020**
Charlottesville/Farmville	CenturyLink	403,369	July 2020 – December 2020
Fredericksburg/Winchester	Verizon	343,031	July 2020 – December 2020
Danville/Lynchburg Church St	Verizon	320,247	July 2020 – December 2020
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	TDS Telecom	5,158	January 2021 – June 2021
Floyd County	Citizens	15,651	January 2021 – June 2021
Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021

| Johnson City/Wytheville | CenturyLink | 338,311 | July 2021 – December 2021 |

The **Sussex County PSAP's** deployment window will be **January 2020 – June 2020**. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least **three months** before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4,000	Flat rate from AT&T
CHE upgrade	$30,000	i3 licenses and services
CHE replacement	$150,000	Replacement planned in FY21
Text-to-911	$30,000	Not deployed
CAD upgrade	$0	Not required
Mapping upgrade	$0	Not required
Voice logging upgrade	$0	Not required
ECaTS Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$0	Not required
Rack space	$0	
Diverse connectivity costs	$1,473,265.67	69K feet of fiber
Disaster recovery upgrade	$0	Not required
Secondary PSAPs	$0	None
GIS data preparation	$30,000	Data work done by a contractor
Legacy 9-1-1 transition costs	$1,222.20	Verizon costs
Project management assistance	$0	None requested
Total	$1,719,487.87	

The monthly recurring cost for the AT&T solution is **$3,909.16** which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately **$1,500**. The estimated monthly increase to the PSAP after deployment is approximately **$2,409.16**. This increase will be covered by the Board for a period of 24 months after deployment is complete. At the end of this period, the entire cost will be the responsibility of the PSAP. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows

and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding

The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:

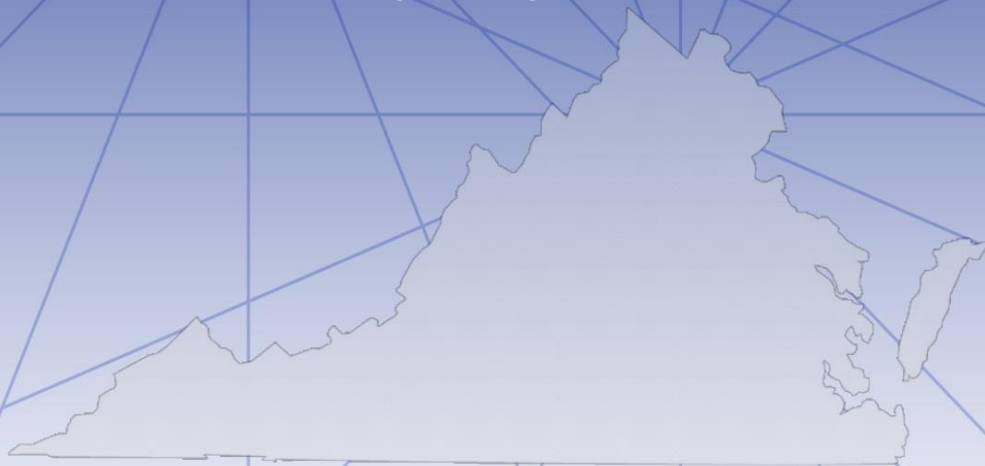| Type of Funding	Amount
Non-recurring	$1,719,487.87
Recurring (over 24 months)	$57,819.84
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Commonwealth of Virginia
Next Generation 9-1-1

Proposal Acceptance Letter

(PAL)

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program.   Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: SUSSEX COUNTY SHERIFF'S OFFICE

CONTACT TITLE: E911 COORDINATOR

CONTACT FIRST NAME: CRYSTAL

CONTACT LAST NAME: WYCHE

ADDRESS 1: 20212 THORNTON SQUARE

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CONTACT MOBILE NUMBER: (434) 246-5361

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Financial Information

Amount Requested: $ 1,777,307.71

Date of Completed Migration Proposal: 11/1/2018

PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

☒ Yes   ☐ No

Commonwealth of Virginia
Next Generation 9-1-1

Rappahannock County
PSAP/GIS Specific
NG9-1-1 Migration Proposal

Executive Summary

This migration proposal is being prepared for the **Rappahannock County PSAP** based on the Fairfax County contract with **AT&T**. **Sandra Carter** shall be the primary contact.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A Migration Proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the **Rappahannock County PSAP** will need to upgrade their current Vesta 911 software or have in place an i3 functional CHE that has been approved on the AT&T ESInet™ to be able to implement the full NENA i3 standard without the need for any interim or transitional steps. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at: https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: **Motorola**
- CHE model: **VESTA 911**
- CHE version number (clients): **6.0**
- CHE version number (server): **6.0**
- CHE maintenance provider (channel): **Century Link**
- CHE Geodiversity: **No**
- Number of positions: **2**
- SIP capable: **Yes**

This CHE will require an upgrade to Vesta 7.2 to implement the full i3 interface. This upgrade will require the purchase of two firewalls to connect to the ESInet. However, if the PSAP deploys text to 9-1-1 with the direct IP solution prior to NG9-1-1 migration, these firewalls will already have been purchased and can be used for both purposes.

The PSAP indicates the planned replacement of their CHE in **FY2020**. This is before their planned NG9 1 1 migration. Any new CHE will need to be tested and i3 functional on the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. The PSAP has not yet deployed text to 9-1-1. Since their deployment for NG9-1-1 is scheduled before the new deadline for text to 9-1-1 deployment, they will deploy it with NG9-1-1 as a direct IP service integrated with their CHE. The cost to implement this will be covered by the Board.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: **DaPro Systems**
- CAD software version: **IBRPro**
- CAD interfaces: **None**
- Method of data transfer: **N/A**

The PSAP currently has grant funds to replace this CAD system. It is the responsibility of the PSAP to assure that the CAD system interfaces appropriately with CHE and NG9-1-1.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: **Digital Graphics Inc.**
- Dispatch Mapping Software Version: **5.26.9.23.2001**
- Method of data transfer: **N/A**

The PSAP currently has grant funds to upgrade or replace this mapping system. It is the responsibility of the PSAP to assure that the mapping system interfaces appropriately with CHE and NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: **NICE**
- Logging Recorder Model: **Inform Essential**
- Logging Recorder Software Version: **6.1**
- Audio Origination Point: **Both trunks and positions**

It is important to note that with an IP connection, audio is not present on the circuit until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio message is played for the caller (which technically requires the CHE to answer the call to play the message). This voice logging recorder system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Data Analytics

Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: **ECaTS**
- Data Analytics Vendor: **ECaTS**

All required upgrades to ECaTS will be handled through the statewide contract at no cost to the PSAP.

Outcall Notification Systems

The PSAP currently does not have an outcall notification system. If one is implemented, AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications

No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space

The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP has confirmed that this space is currently available.

Coordination with Open Grants

The PSAP currently has two open grants:

1. **FY18 – Mapping - $150,000**
2. **FY19 – CAD - $75,000**

GIS Data Preparation

GIS Data Sources

Currently, **Rappahannock County** maintains all of the GIS data for the PSAP and will be the source for all GIS data required for NG9-1-1 geospatial routing; however, other departments within the locality may contribute data or manage various processes. It is the responsibility of **Rappahannock County PSAP** to aggregate the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness

Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met, the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is recommending the additional goal of matching 98% of ALI database addresses when geocoded against the address point data layer. If either of these goals in not achieved, then GIS data work must be completed to meet or exceed these goals. While financial support from the PSAP grant program may be

available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline (RCL) – **86.3%**
- Address Point – **76.7%**

The primary issue with the RCL data is differences in street names between the ALI and GIS data. Correcting the street names so they match would increase the match rate for RCL to **93.9%**. The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to **80.1%**. During July 2018, VITA will send each PSAP and/or GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place:

1. **Add a record to the GIS** – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. **Change attribution in the GIS** – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.
3. **Change attribution in the ALI database** – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.
4. **Determine that the discrepancy is not an error** – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While many of those records were filtered out of the analysis, some may still be within the data. These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty when routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in

two or more matches. Since certainty of a location is important, checks are performed to ensure no duplicate data exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - **81**
- Road centerline has right or left side overlapping address range - **131**
- Road centerline has street name attributes not meeting Virginia, USPS, & NENA standard - **0**
- Address point Is duplicate, has no street name, or no address number - **730**
- Address point street name and road centerline street name mismatch - **222**

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Regardless of how they are resolved, **Rappahannock County** will need to resolve these issues through internal resources, at least three months prior to the targeted deployment date

PSAP Boundary

This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary

This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Making sure there is agreement of that point and ensuring each locality is only providing data where they are the authoritative GIS data source are the purpose of this assessment. External edge-matching conformance addresses boundaries between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. Geometric features need to meet at the agreed upon boundary.

MSAG transition/confirmation

In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution. While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is a better solution since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG, an emergency service number (ESN) data layer must exist or be created. The PSAP has **13 ESNs** for their area of responsibility. **Rappahannock County** has an ESN boundary layer depicting this area so they will utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not part of a locality's existing maintenance workflow or GIS database, they can be created by building a separate polygon layer and transferring these values to the centerline segments (commonly referred to

as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

GIS Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing updated GIS data. Localities wishing to use existing tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to accept and resolve discrepancy calls (formalized requests to update GIS datasets), and periodically transfer updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important that localities document GIS data maintenance workflows and validations to ensure synchronization across GIS layers. This can include periodically ensuring conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use and the CHE is i3 capable.

The two interim solutions are as follows:

> **Legacy PSAP Gateway** - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

> **Transitional SIP** - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to

the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: **Century Link**
- ALI database provider: **Century Link**
- Selective router pair(s): **Charlottesville/Farmville**
- Trunk counts (all): **9**
  - Wireline: **4**
  - Wireless: **4**
  - SIP: **0**
  - Administrative: **1**

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be discussed with AT&T during system configuration. The options include providing the caller with a fast busy signal, routing the call to another PSAP, or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant connections follow different paths that never touch from origin to destination. To achieve the 99.999%

availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP and the results for the current location of the **Rappahannock County** PSAP are as follows:
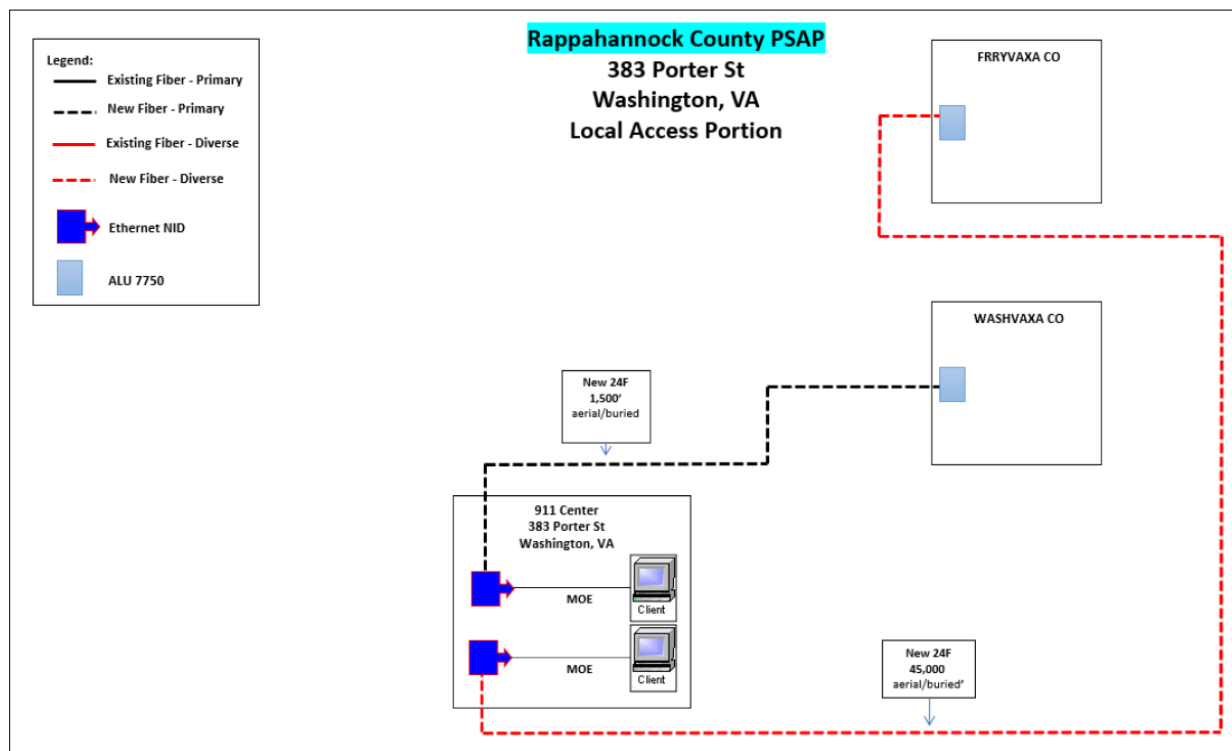
The total cost for this diverse connectivity is **$528,000**, which will be provided by the Board as part of the PSAP's funding submission. Also, there is a one-time $82,000 charge for all CenturyLink sites. That cost will be provided by the Board as part of the first PSAP's funding submission that choses the AT&T solution. The timing of the implementation of the diverse connectivity may not be completed until after initial NG9-1-1 deployment.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP has a disaster recovery plan that states, if the PSAP must be evacuated for any reason, or should just the network be unavailable and the PSAP can still be occupied, calls are rerouted to the **Warren County PSAP**.

Based on the current disaster recovery plan, no additional steps must be taken in order for this plan to continue to be viable with NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP
There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security
AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality
- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.

- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	Verizon	1,660,182	January 2020 – June 2020
Charlottesville/Farmville	**CenturyLink**	**403,369**	**July 2020 – December 2020**
Fredericksburg/Winchester	Verizon	343,031	July 2020 – December 2020
Danville/Lynchburg Church St	Verizon	320,247	July 2020 – December 2020
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	TDS Telecom	5,158	January 2021 – June 2021
Floyd County	Citizens	15,651	January 2021 – June 2021
Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021
Johnson City/Wytheville	CenturyLink	338,311	July 2021 – December 2021

The **Rappahannock County PSAP's** deployment window will be **July 2020 – December 2020**. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least **three months** before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4,000	Flat rate from AT&T
CHE upgrade	$30,000	i3 licenses and services
CHE replacement	$150,000	CHE replacement in FY2020
Text-to-911	$30,000	Firewalls and professional services
CAD upgrade	$0	Utilizing grant funds
Mapping upgrade	$0	Utilizing grant funds
Voice logging upgrade	$0	Not required
ECaTS Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$0	Not required
Rack space	$0	Rack space is available
Diverse connectivity costs	$528,000	+$82,000 if first Century Link PSAP
Disaster recovery upgrade	$0	Not required
Secondary PSAPs	$0	None
GIS data preparation	$0	Not required
Legacy 9-1-1 transition costs	$1,076.70	Century Link costs
Project management assistance	$0	None requested
Total	$744,076.70	

The monthly recurring cost for the AT&T solution is **$3,471.35** which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately **$2,392.00**. The estimated monthly increase to the PSAP after deployment is approximately **$1,079.35**. This increase will be covered by the Board for a period of 24 months after deployment is complete. At the end of this period, the entire cost will be the responsibility of the PSAP. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding

The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines

approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:

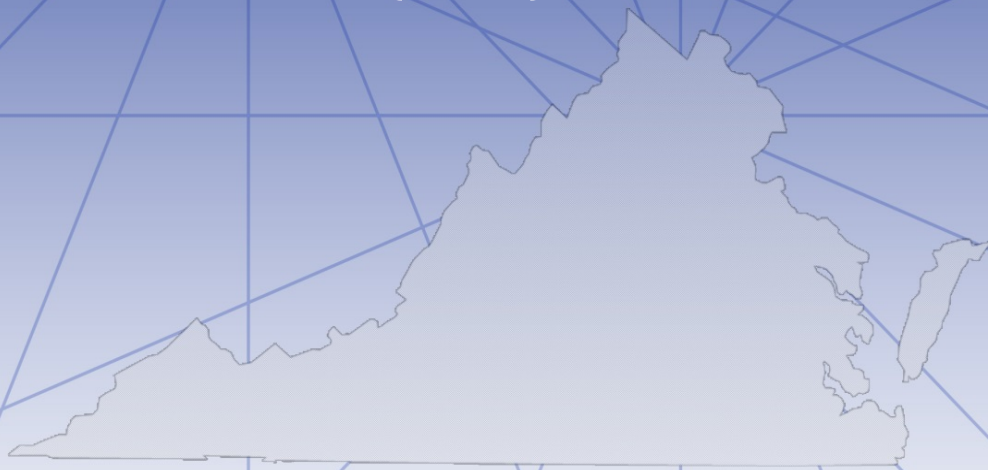| Type of Funding	Amount
Non-recurring	$744,076.70
Recurring (over 24 months)	$25,904.40
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Commonwealth of Virginia
Next Generation 9-1-1

Proposal Acceptance Letter
(PAL)

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program. Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: Rappahannock County

CONTACT TITLE: E911- Coordinator

CONTACT FIRST NAME: Sandra

CONTACT LAST NAME: Carter

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ZIP CODE: 22747

CONTACT EMAIL: sdcarter@rappahannockcountyva.gov

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CONTACT MOBILE NUMBER: 540-272-9518

CONTACT FAX NUMBER: 540-675-5341

Financial Information

Amount Requested: $ 769,981.10

Date of Completed Migration Proposal: November 1, 2018

PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

 X Yes   ☐ No

Commonwealth of Virginia
Next Generation 9-1-1

City of Portsmouth
PSAP/GIS Specific
NG9-1-1 Migration Proposal

www.vita.virginia.gov

Executive Summary

This migration proposal is being prepared for the City of Portsmouth based on the Fairfax County contract with AT&T. Chris Patterson shall be the primary contact.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A Migration Proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the Portsmouth PSAP will be able to implement the full NENA i3 standard without the need for any interim or transitional steps unless their current call handling equipment cannot be made i3 capable. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at:

https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: Motorola
- CHE model: ECW CallStation with Maps
- CHE version number (clients): 4.0.15.63330
- CHE version number (server): 4.0.15.63330
- CHE maintenance provider (channel): Motorola
- CHE Geodiversity: No
- Number of positions: 11
- SIP capable: Yes

This CHE has been determined to be SIP capable, but is in testing on the AT&T network to determine if i3 capable. A legacy PSAP gateway (LPG) may be required if testing is not complete at time of deployment. Once testing is complete and the CHE certified as i3 capable in the AT&T network, then the CHE can be migrated to i3 call routing. There will be no functionality loss during the time of LPG use. The voice call will still be delivered as IP (SIP), but the location data will still be pulled with an ALI dip. It will still use IP to deliver the data, but it follows a different path than the voice.

The PSAP indicates the planned replacement of their CHE in February 2021. This is after their planned NG9-1-1 migration. Any new CHE will need to be tested and i3 functional on the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. The PSAP has not yet deployed text to 9-1-1. Since their deployment for NG9-1-1 is scheduled before the new deadline for text to 9-1-1 deployment, they will deploy it with NG9-1-1 as a direct IP service integrated with their CHE. The cost to implement this will be covered by the Board.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: Superion
- CAD software version: 17.5
- CAD interfaces: ALI data interface
- Method of data transfer: Serial data

This CAD system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: Superion
- Dispatch Mapping Software Version: 17.5
- Method of data transfer: Through CAD

This mapping display system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: Applied Digital Solutions/Dictaphone/NICE
- Logging Recorder Model:
- Logging Recorder Software Version:
- Audio Origination Point: Unknown

This voice logging recorder system has been determined to not require any upgrade or modification with the deployment of NG9-1-1. It is important to note that while trunk-based recording is possible with NG9-1-1, it will not mirror current functionality. Currently, with analog trunks, trunk-based recording allows the audio to be captured before the call is answered by the call taker and the call is still in queue. With an IP connection, the audio is not present on the circuit until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio

message is played for the caller (which technically requires the CHE to answer the call to play the message).

Data Analytics
Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: ECaTS
- Data Analytics Vendor: West/ECaTS

All required upgrades to ECaTS will be handled through the statewide contract at no cost to the PSAP.

Outcall Notification Systems
The PSAP currently uses Civic Ready as their outcall notification system. AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications
No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space
The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP has confirmed that this space is currently or will be available.

Coordination with Open Grants
The PSAP currently has no open grants, as of April 1, 2018, that would impact NG9-1-1 deployment.

GIS Data Preparation

GIS Data Sources
Currently, the City of Portsmouth GIS Division maintains all of the GIS data for the PSAP and will be the source for all GIS data required for NG9-1-1 geospatial routing; however, other departments within the locality may contribute data or manage various processes. It is the responsibility of Portsmouth GIS to aggregate the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness
Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met, the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is recommending the additional goal of matching 98% of ALI database addresses when geocoded against the address point data layer. If either of these goals in not achieved, then GIS data work must be completed to meet or exceed these goals. While financial support from the PSAP grant program may be

available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline (RCL) – 96.9%
- Address Point – 89.1%

The primary issue with the RCL data is differences in street names between the ALI and GIS data. Correcting the street names so they match would increase the match rate for RCL to 99.1%. The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to 94.0%. During July 2018, VITA will send each PSAP and GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place:

1. Add a record to the GIS – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. Change attribution in the GIS – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.
3. Change attribution in the ALI database – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.
4. Determine that the discrepancy is not an error – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While many of those records were filtered out of the analysis, some may still be within the data. These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in two or more matches. Since certainty of a location is important, checks are performed to ensure no duplicate data

exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - 0
- Road centerline has right or left side overlapping address range - 3
- Road centerline has street name attributes not meeting Virginia, USPS, & NENA standard - 96
- Address point Is duplicate, has no street name, or no address number - 1,209
- Address point street name and road centerline street name mismatch - 210

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Regardless of how they are resolved, the City of Portsmouth will need to resolve these issues through internal resources at least 3 months prior to the targeted deployment date.

PSAP Boundary

This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary

This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Edge-matching conformance addresses boundaries between GIS sources within a PSAP and between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. GIS features need to meet at the agreed upon boundary for geometric continuity and attribute consistency.

MSAG transition/confirmation

In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution. While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is the end-state goal for full i3 implementation since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG, an emergency service number (ESN) data layer must exist or be created. The PSAP has three ESNs for their area of responsibility. The Portsmouth GIS maintains an ESN boundary layer, so they will utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not part of a locality's existing maintenance workflow or GIS database, they can be created by building a separate polygon layer and transferring these values to the centerline segments (commonly referred to as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

GIS Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing GIS data to the AT&T Spatial Interface. Localities wishing to use existing internal tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to review and resolve error and discrepancy reports within the timeframe required by AT&T and periodically provide updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important localities document GIS data maintenance workflows to ensure maintenance activities engage all responsible entities. It is equally important to ensure GIS maintenance workflows and procedures are updated to be compatible with discrepancy management required to support NG9-1-1. NG9-1-1 will introduce additional maintenance issues such as periodically reviewing conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use and the CHE is i3 capable.

The two interim solutions are as follows:

> Legacy PSAP Gateway - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

> Transitional SIP - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to

the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: Verizon
- ALI database provider: Verizon
- Selective router pair(s): High Street/Jefferson Avenue
- Trunk counts (all): 25
    - Wireline: 8
    - Wireless: 8
    - SIP: 2
    - Administrative: 7

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be discussed with AT&T during system configuration. The options include providing the caller with a fast busy signal, routing the call to another PSAP, or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant connections follow different paths that never touch from origin to destination. To achieve the 99.999%

availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP and the results for the current location of the Portsmouth PSAP are as follows:
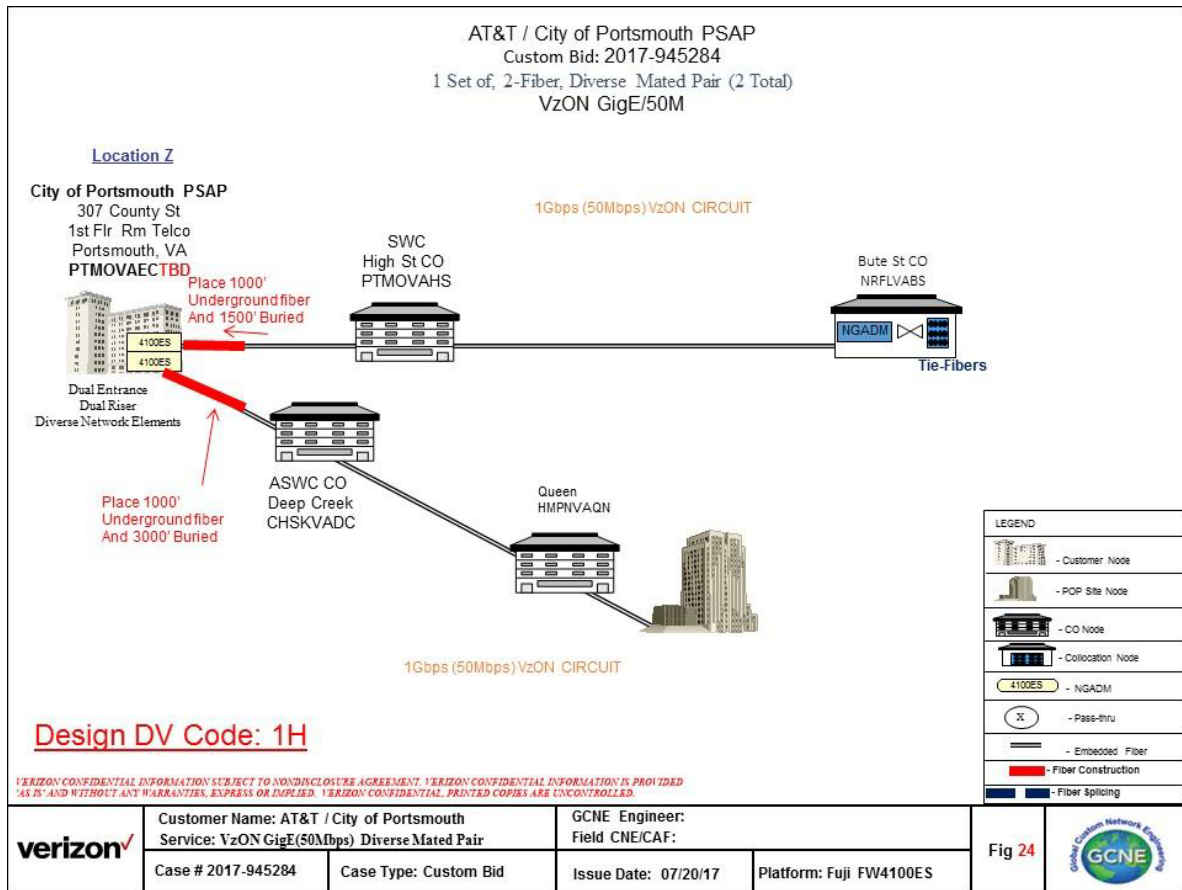
The total cost for this diverse connectivity is $115,568.51, which will be provided by the Board as part of the PSAP's funding submission. The timing of the implementation of the diverse connectivity may not be completed until after initial NG9-1-1 deployment.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP has a disaster recovery plan, which states that if the PSAP must be evacuated for any reason, the calls all transferred to a backup PSAP. Should just the network be unavailable and the PSAP can still be occupied, calls are rerouted to a 10-digit number within the PSAP.

Based on the current disaster recovery plan, no additional steps must be taken in order for this plan to continue to be viable with NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP
There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security
AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality
- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.

- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	Verizon	1,660,182	January 2020 – June 2020
Charlottesville/Farmville	CenturyLink	403,369	July 2020 – December 2020
Fredericksburg/Winchester	Verizon	343,031	July 2020 – December 2020
Danville/Lynchburg Church St	Verizon	320,247	July 2020 – December 2020
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	TDS Telecom	5,158	January 2021 – June 2021
Floyd County	Citizens	15,651	January 2021 – June 2021
Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021
Johnson City/Wytheville	CenturyLink	338,311	July 2021 – December 2021

The Portsmouth PSAP's deployment window will be July 2019 – December 2019. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least three months before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4,000	Flat rate from AT&T
CHE upgrade	$15,000	i3 licenses and services
CHE replacement	$150,000	Replacement planned in FY21
Text to 9-1-1	$15,000	Text to 9-1-1 Installation
CAD upgrade	$0	Not required
Mapping upgrade	$0	Not required
Voice logging upgrade	$0	Not required
ECaTS Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$0	Not required
Rack space	$0	Not required
Diverse connectivity costs	$115,568.51	
Disaster recovery upgrade	$0	Not required
Secondary PSAPs	$0	None
GIS data preparation	$0	Included in FY18 shared services grant.
Legacy 9-1-1 transition costs	$16,063.20	Verizon costs
Project management assistance	$0	None requested
Total	$316,631.71	

The monthly recurring cost for the AT&T solution is $12,171.08, which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately $7,500.00. The estimated monthly increase to the PSAP after deployment is approximately $4,671.08. This increase will be covered by the Board for a period of 24 months after deployment is complete. At the end of this period, the entire cost will be the responsibility of the PSAP. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding
The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines

approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:

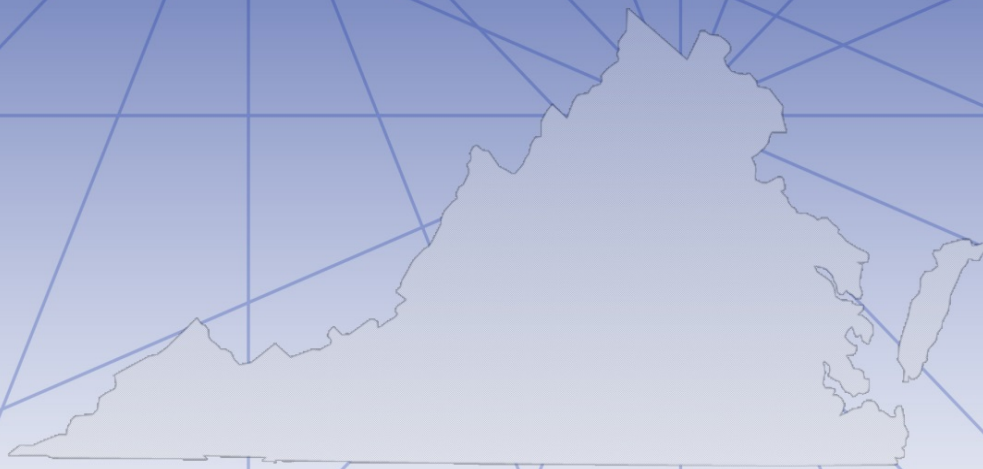| Type of Funding	Amount
Non-recurring	$316,631.71
Recurring (over 24 months)	$112,105.92
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Commonwealth of Virginia
Next Generation 9-1-1

Proposal Acceptance Letter
(PAL)

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program. Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: City of Portsmouth PSAP Center

CONTACT TITLE: Chief Information Officer

CONTACT FIRST NAME: Daniel

CONTACT LAST NAME: Jones

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CONTACT PHONE NUMBER: 757-393-8398

CONTACT MOBILE NUMBER: 757-402-6506

CONTACT FAX NUMBER: N/A

Financial Information

Amount Requested: $ 428,737,63

Date of Completed Migration Proposal: November 1st, 2018

PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

☒ Yes   ☐ No

Commonwealth of Virginia
Next Generation 9-1-1

Northumberland County
PSAP/GIS Specific
NG9-1-1 Migration Proposal

www.vita.virginia.gov

Executive Summary

This migration proposal is being prepared for the **Northumberland County PSAP** based on the Fairfax County contract with **AT&T**. **Robert Headley** shall be the primary contacts.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A Migration Proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the **Northumberland County PSAP** will need to have i3-capable call handling equipment in place that has been approved on the AT&T ESInet™ to be able to implement the full NENA i3 standard without the need for any interim or transitional steps. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at: https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: **Motorola**
- CHE model: **Vesta**
- CHE version number (clients): **4.3.1**
- CHE version number (server): **4.3.1**
- CHE maintenance provider (channel): **Radio Communications of Virginia**
- CHE Geodiversity: **No**
- Number of positions: **3**
- SIP capable: **No**

This CHE will require an upgrade to Vesta 7.2 to implement the full i3 interface. This upgrade will require the purchase of two firewalls to connect to the ESInet. However, if the PSAP deploys text to 9-1-1 with the direct IP solution prior to NG9-1-1 migration, these firewalls will already have been purchased and can be used for both purposes.

The PSAP indicates the planned replacement of their CHE in **January 2020.** This is after the planned NG9-1-1 migration. Any new CHE will need to be tested and i3 functional on the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. The PSAP has not yet deployed text to 9-1-1. Since their deployment for NG9-1-1 is scheduled before the new deadline for text to 9-1-1 deployment, they will deploy it with NG9-1-1 as a direct IP service integrated with their CHE. The cost to implement this will be covered by the Board.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: **SOMA Global**
- CAD software version: **5.2**
- CAD interfaces: **Yes**
- Method of data transfer: **IP**

This CAD system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: **GeoComm**
- Dispatch Mapping Software Version: **GeoLynx 8.18.3**
- Method of data transfer: **IP**

This mapping display system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: **Verint**
- Logging Recorder Model: **Impact 360**
- Logging Recorder Software Version: **5.2.2.10**
- Audio Origination Point: **Trunk**

While the voice logging recorder system does not require any upgrade or modification with the deployment of NG9-1-1, if the PSAP wishes to maintain trunk-based recording, a span port will be provided by AT&T. The recording system may require an upgrade to receive and interpret the IP data. If desired, the cost of this upgrade would be covered by the Board. It is important to note that while this will allow audio to be pulled from the IP talk paths, it will not mirror current functionality. Currently, with analog trunks, trunk-based recording allows the audio to be captured before the call is answered by the call taker and the call is still in queue. With an IP connection, the audio is not present on the circuit

until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio message is played for the caller (which technically requires the CHE to answer the call to play the message). The PSAP can choose to convert to position-based recording and the Board will cover the cost of reconfiguration.

Data Analytics
Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: **ECaTS**
- Data Analytics Vendor: **ECaTS**

All required upgrades to ECaTS will be handled through the statewide contract at no cost to the PSAP.

Outcall Notification Systems
The PSAP currently uses **CodeRed** as their outcall notification system. AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications
No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space
The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP has confirmed that this space is currently or will be available.

Coordination with Open Grants
The PSAP currently has no open grants, as of April 1, 2018, that would impact NG9-1-1 deployment.

GIS Data Preparation

GIS Data Sources
Currently, the **Northumberland County Planner** maintains all of the GIS data for the PSAP and will be the source for all GIS data required for NG9-1-1 geospatial routing; however, other departments within the locality may contribute data or manage various processes. It is the responsibility of the **Northumberland County Planner** to aggregate the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness
Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met, the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is

recommending the additional goal of matching 98% of ALI database addresses when geocoded against the address point data layer. If either of these goals in not achieved, then GIS data work must be completed to meet or exceed these goals. While financial support from the PSAP grant program may be available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline (RCL) – **99.7%**
- Address Point – **99.8%**

The **Northumberland County** currently exceeds both goals. If they desire a greater match rate, there are some differences in street names between the ALI and GIS data. Correcting the street names so they match would increase the match rate for RCL to **99.8%**. The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to **100%**. During July 2018, VITA will send each PSAP and/or GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place:

1. **Add a record to the GIS** – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. **Change attribution in the GIS** – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.
3. **Change attribution in the ALI database** – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.
4. **Determine that the discrepancy is not an error** – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While many of those records were filtered out of the analysis, some may still be within the data.

These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty when routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in two or more matches. Since certainty of a location is important, checks are performed to ensure no duplicate data exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - **0**
- Road centerline has right or left side overlapping address range -**0**
- Road centerline has street name attributes not meeting Virginia, USPS, & NENA standard - **0**
- Address point Is duplicate, has no street name, or no address number - **15**
- Address point street name and road centerline street name mismatch - **7**

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Regardless of how they are resolved, **Northumberland County** will need to resolve these issues through internal resources or the existing grant at least 3 months prior to the targeted deployment date.

PSAP Boundary

This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary

This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Making sure there is agreement of that point and ensuring each locality is only providing data where they are the authoritative GIS data source are the purpose of this assessment. External edge-matching conformance addresses boundaries between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. Geometric features need to meet at the agreed upon boundary.

MSAG transition/confirmation

In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution. While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is a better solution since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG, an emergency service number (ESN) data layer must exist or be created. The PSAP has **seven ESNs** for

their area of responsibility. **Northumberland County** maintains an ESN boundary layer depicting this area so they will utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not part of a locality's existing maintenance workflow or GIS database, they can be created by building a separate polygon layer and transferring these values to the centerline segments (commonly referred to as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing updated GIS data. Localities wishing to use existing tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to accept and resolve discrepancy calls (formalized requests to update GIS datasets), and periodically transfer updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important that localities document GIS data maintenance workflows and validations to ensure synchronization across GIS layers. This can include periodically ensuring conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use and the CHE is i3 capable.

The two interim solutions are as follows:

> **Legacy PSAP Gateway** - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI

lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

Transitional SIP - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary as long as the CHE is upgrades. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: **Verizon**
- ALI database provider: **Verizon**
- Selective router pair(s): **Chester/Richmond Stuart**
- Trunk counts (all): **20**
    - Wireline: **4**
    - Wireless: **4**
    - SIP: **0**
    - Administrative: **12**

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be discussed with AT&T during system configuration. The options include providing the caller with a fast

busy signal, routing the call to another PSAP, or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant connections follow different paths that never touch from origin to destination. To achieve the 99.999% availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP and the results for the current location of the **Northumberland County** PSAP are as follows:
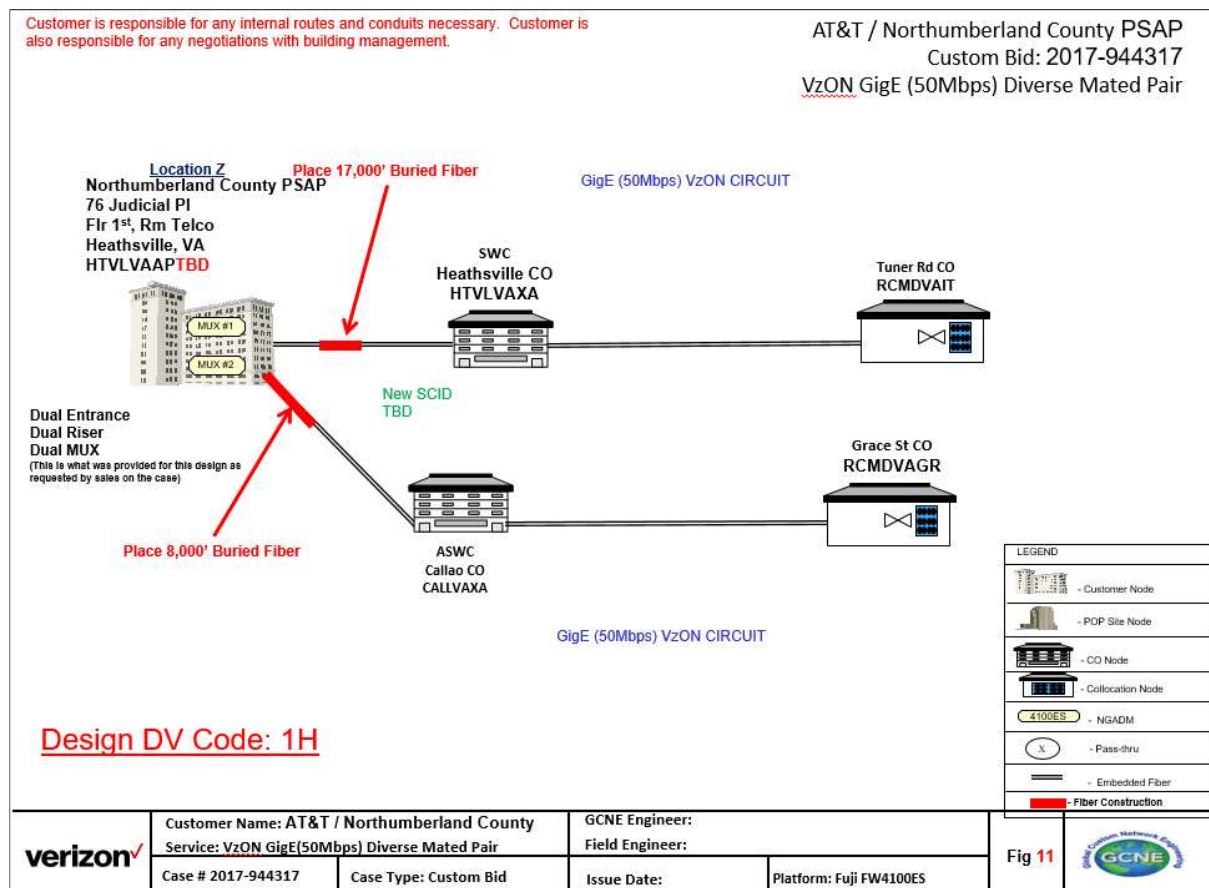
The total cost for this diverse connectivity is **$938,829.86** which will be provided by the Board as part of the PSAP's funding submission. The timing of the implementation of the diverse connectivity may not be completed until after initial NG9-1-1 deployment.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP **does not have a disaster recovery plan**, for if the PSAP must be evacuated for any reason, or if the 9-1-1 network is unavailable. If the PSAP can still be occupied, calls will be sent to 10-digit administrative lines.

Based on the current disaster recovery plan, no additional steps be taken in order for this plan to continue to be viable with NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP
There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security
AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality
- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than

supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.
- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	**Verizon**	**1,660,182**	**January 2020 – June 2020**
Charlottesville/Farmville	CenturyLink	403,369	July 2020 – December 2020
Fredericksburg/Winchester	Verizon	343,031	July 2020 – December 2020
Danville/Lynchburg Church St	Verizon	320,247	July 2020 – December 2020
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	TDS Telecom	5,158	January 2021 – June 2021
Floyd County	Citizens	15,651	January 2021 – June 2021
Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021

| Johnson City/Wytheville | CenturyLink | 338,311 | July 2021 – December 2021 |

The **Northumberland County PSAP's** deployment window will be **January 2020 – June 2020**. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least **three months** before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4,000	Flat rate from AT&T
CHE upgrade	$30,000	i3 deployment services
CHE replacement	$150,000	Estimated replacement FY20
Text-to-911	$30,000	Not currently deployed
CAD upgrade	$0	Not required
Mapping upgrade	$0	Not required
Voice logging upgrade	$0	Not required
ECaTS Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$0	Not required
Rack space	$0	Rack space is available
Diverse connectivity costs	$938,829.86	25K feet buried fiber
Disaster recovery upgrade	$0	Not required
Secondary PSAPs	$0	None
GIS data preparation	$0	
Legacy 9-1-1 transition costs	$1,105.80	Verizon costs
Project management assistance	$0	None requested
Total	$1,154,935.66	

The monthly recurring cost for the AT&T solution is **$4,037.45** which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately **$490.67**. The estimated monthly increase to the PSAP after deployment is approximately **$3,546.78**. This increase will be covered by the Board for a period of 24 months after deployment is complete. At the end of this period, the entire cost will be the responsibility of the PSAP. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding

The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:
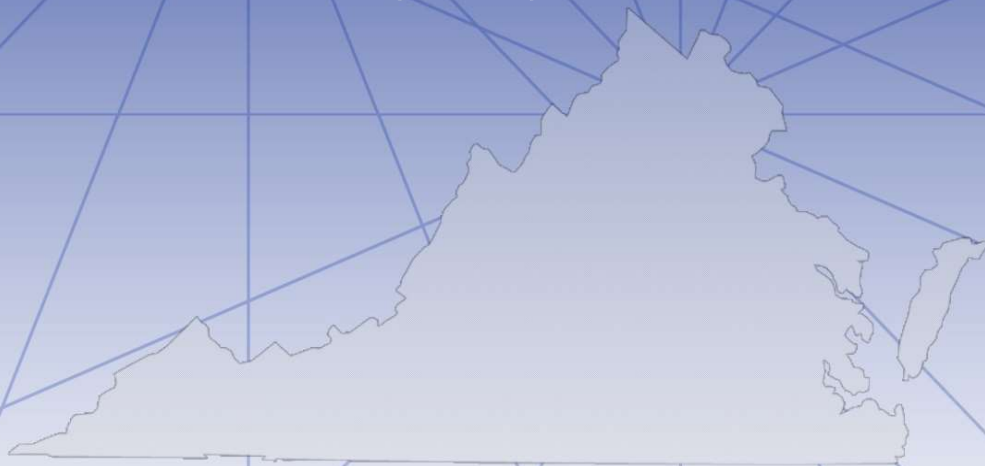
Type of Funding	Amount
Non-recurring	$1,154,935.66
Recurring (over 24 months)	$85,122.72
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Commonwealth of Virginia
Next Generation 9-1-1

Proposal Acceptance Letter
(PAL)

www.vita.virginia.gov

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program. Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: Northumberland County Sheriff's Office

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Financial Information

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PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

☒ Yes   ☐ No

Commonwealth of Virginia
Next Generation 9-1-1

Mecklenburg County
PSAP/GIS Specific
NG9-1-1 Migration Proposal

Executive Summary

This migration proposal is being prepared for **Mecklenburg County** based on the Fairfax County contract with **AT&T**. **Ben Duncan** shall be the primary contact.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A Migration Proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the **Mecklenburg PSAP** will be able to implement the full NENA i3 standard without the need for any interim or transitional steps. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at:

https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: **Motorola CallWorks**
- CHE model: **CallStation WM**
- CHE version number (clients): **4.2.7.4.77316**
- CHE version number (server): **4.2.7.4.77316**
- CHE maintenance provider (channel): **Motorola**
- CHE Geodiversity: **N/A**
- Number of positions: **5**
- SIP capable: **Yes**

This CHE has been determined to be SIP capable, but is in testing on the AT&T network to determine if i3 capable. A legacy PSAP gateway (LPG) may be required if testing is not complete at time of deployment until such time as the Motorola CallWorks system is certified as working with the AT&T ESInet. At that time, the CHE can be migrated to i3 call routing. There will be no functionality loss during this time. The voice call will still be delivered as IP (SIP), but the location data will still be pulled with an ALI dip. It will still use IP to deliver the data, but it follows a different path than the voice.

The PSAP reports plans to replace their CHE in October 2020. If their current equipment is not certified by that time, the new CHE must be i3 capable and should be tested to be connected to the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. The PSAP has not yet deployed text to 9-1-1. Since their deployment for NG9-1-1 is before the new deadline for text to 9-1-1 deployment, they will deploy it with NG9-1-1 as a direct IP service integrated with their CHE. The cost to implement this on the existing CHE must be determined, but will be covered by the Board.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: **Shield Technology Corporation**
- CAD software version: **SHIELDWARE**
- CAD interfaces: **ALI data interface**
- Method of data transfer: **Serial data**

This CAD system has been determined to not require any upgrade or modification with the deployment of NG9-1-1. The PSAP has identified that their CAD system is scheduled for replacement by September 2019. This project will encompass CAD, records management and mobile data. This project should not impact or be impacted by the NG9-1-1 migration, but care will be taken to schedule the NG9-1-1 migration after the CAD system deployment. As a result, any delay in the CAD projects execution needs to be reported to VITA and AT&T.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: **GeoComm GeoLynx Desktop**
- Dispatch Mapping Software Version: **10.2**
- Method of data transfer: **Serial**

This mapping display system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: **Eventide**
- Logging Recorder Model: **NexLog**
- Logging Recorder Software Version: **2.7.3 (216)**
- Audio Origination Point: **Trunk-based.**

While the voice logging recorder system does not require any upgrade or modification with the deployment of NG9-1-1, if the PSAP wishes to maintain trunk-based recording, a span port will be provided by AT&T. The recording system may require an upgrade to receive and interpret the IP data. If

desired, the cost of this upgrade would be covered by the Board. It is important to note that while this will allow audio to be pulled from the IP talk paths, it will not mirror current functionality. Currently, with analog trunks, trunk-based recording allows the audio to be captured before the call is answered by the call taker and the call is still in queue. With an IP connection, the audio is not present on the circuit until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio message is played for the caller (which technically requires the CHE to answer the call to play the message). The PSAP can choose to convert to position-based recording and the Board will cover the cost of reconfiguration.

Data Analytics

Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: **ECW 911 Decision Station**
- Data Analytics Vendor: **Motorola & West/ECaTS**
- Data Analytics Version: **4.2.7.4.77316**

All required upgrades to ECaTS will be handled through the statewide contract at no cost to the PSAP and no required upgrades to the Motorola system had been identified.

Outcall Notification Systems

The PSAP currently uses **Everbridge** as their outcall notification system. AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications

No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space

The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP has confirmed that this space is currently or will be available.

Coordination with Open Grants

The PSAP currently has open grants, as of April 1, 2018, as follows with the noted status:

1. **FY18 – Regional GIS with Halifax and Brunswick $40,000**

To ensure the grant funds support the migration to NG9-1-1, the PSAP should, to the extent practical, use funding from the FY18 regional GIS grant to correct geospatial issues identified in the following section.

GIS Data Preparation

GIS Data Sources

Currently, the **Southside Planning District Commission (SSPDC)** maintains all of the GIS data for the PSAP and will be the source for all GIS data required for NG9-1-1 geospatial routing; however, other

departments within the locality may contribute data or manage various processes. It is the responsibility of the **SSPDC** to aggregate the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness

Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met, the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is recommending the additional goal of matching 98% of ALI database addresses when geocoded against the address point data layer. If either of these goals in not achieved, then GIS data work must be completed to meet or exceed these goals. While financial support from the PSAP grant program may be available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline (RCL) – **97.6%**
- Address Point – **96.2%**

The primary issue with the RCL data is differences in street names between the ALI and GIS data. Correcting the street names so they match would increase the match rate for RCL to **98.2%**. The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to **98.2%**. During July 2018, VITA will send each PSAP and GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place:

1. **Add a record to the GIS** – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. **Change attribution in the GIS** – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.

3. **Change attribution in the ALI database** – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.

4. **Determine that the discrepancy is not an error** – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While many of those records were filtered out of the analysis, some may still be within the data. These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in two or more matches. Since certainty of a location is important, checks are performed to ensure no duplicate data exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - **4**
- Road centerline has right or left side overlapping address range - **123**
- Road centerline has street name attributes not meeting Virginia, USPS, & NENA standard - **0**
- Address point Is duplicate, has no street name, or no address number - **171**
- Address point street name and road centerline street name mismatch - **189**

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Regardless of how they are resolved, the **Southside Planning District Commission** will need to resolve these issues through internal resources at least 3 months prior to the targeted deployment date.

PSAP Boundary

This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary

This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Edge-matching conformance addresses boundaries between GIS sources within a PSAP and between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. GIS features need to meet at the agreed upon boundary for geometric continuity and attribute consistency.

MSAG transition/confirmation

In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution. While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is the end-state goal for full i3 implementation since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG, an emergency service number (ESN) data layer must exist or be created. The PSAP has approximately 37 ESNs for their area of responsibility. The PSAP maintains service boundaries for the first responding agencies, which can be used to create an ESN boundary layer. As a result, they can utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not part of a locality's existing maintenance workflow or GIS database, they can be created by building a separate polygon layer and transferring these values to the centerline segments (commonly referred to as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

GIS Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing updated GIS data. Localities wishing to use existing tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to accept and resolve discrepancy calls (formalized requests to update GIS datasets), and periodically transfer updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important localities document GIS data maintenance workflows to ensure maintenance activities engage all responsible entities. It is equally important to ensure GIS maintenance workflows and procedures are updated to be compatible with discrepancy management required to support NG9-1-1. NG9-1-1 will introduce additional maintenance issues such as periodically reviewing conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows. Additionally, the existing FY18 share services GIS grant will be evaluating these processes and will recommend improvements.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate

on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use and the CHE is i3 capable.

The two interim solutions are as follows:

> **Legacy PSAP Gateway** - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

> **Transitional SIP** - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: **Verizon**
- ALI database provider: **Verizon**
- Selective router pair(s): **Stuart/Chester**
- Trunk counts (all): **12**
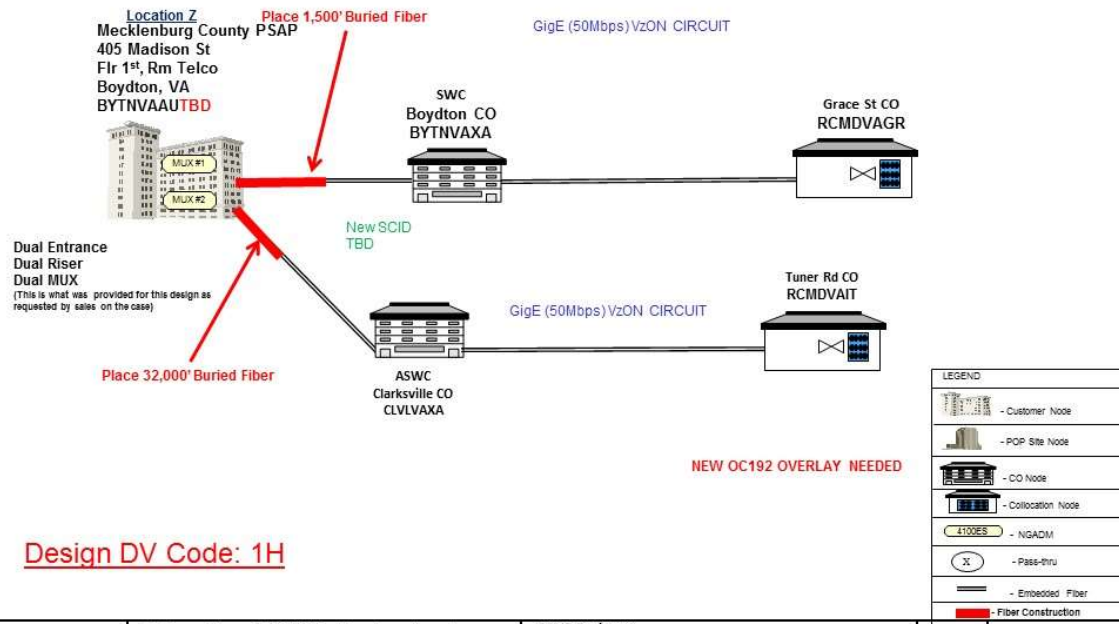
- Wireline: **6**
- Wireless: **6**

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be discussed with AT&T during system configuration. The options include providing the caller with a fast busy signal, routing the call to another PSAP or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant connections follow different paths that never touch from origin to destination. To achieve the 99.999% availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP and the results are as follows:

The total cost for this diverse connectivity is **$1,048,380.14**, which will be provided by the Board as part of the PSAP's funding submission. The timing of the implementation of the diverse connectivity may not be completed until after initial NG9-1-1 deployment.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a

neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP has a disaster recovery plan, which states that if the PSAP must be evacuated for any reason, the calls all transferred to the **Brunswick County PSAP**. Should just the network be unavailable and the PSAP can still be occupied, calls are rerouted to a 10-digit number within the PSAP.

Based on the current disaster recovery plan, no additional steps must be taken in order for this plan to continue to be viable with NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP
There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security
AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality
- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.
- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	**Verizon**	**1,660,182**	**January 2020 – June 2020**
Charlottesville/Farmville	CenturyLink	403,369	July 2020 – December 2020
Fredericksburg/Winchester	Verizon	343,031	July 2020 – December 2020
Danville/Lynchburg Church St	Verizon	320,247	July 2020 – December 2020
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	TDS Telecom	5,158	January 2021 – June 2021
Floyd County	Citizens	15,651	January 2021 – June 2021

Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021
Johnson City/Wytheville	CenturyLink	338,311	July 2021 – December 2021

The **Mecklenburg PSAP's** deployment window will be **January 2020 – June 2020**. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least three months before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4,000	Flat rate from AT&T
CHE replacement	$150,000	CHE replacement in FY2021
CHE upgrade	$15,000	i3 licenses and services
Text to 9-1-1	$15,000	Integrated solution
CAD upgrade	$0	Not required
Mapping upgrade	$0	Not required
Voice logging upgrade	$0	Not required
Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$0	Not required
Rack space	$0	Not required
Diverse connectivity costs	$1,048,380.14	
Disaster recovery upgrade	$0	Not required
Secondary PSAPs	$0	None
GIS data preparation	$0	Included in FY18 GIS grant.
Legacy 9-1-1 transition costs	$5,383.50	Verizon costs
Project management assistance	$0	None requested
Total	$1,238,763.64	

The monthly recurring cost for the AT&T solution is **$5,941.17**, which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately **$5,166.00**. The estimated monthly increase to the PSAP after deployment is approximately **$775.17**. This increase will be covered by the Board for a period of 24 months after deployment is complete. At the end of this period, the entire cost will be the responsibility of the PSAP. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding

The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:

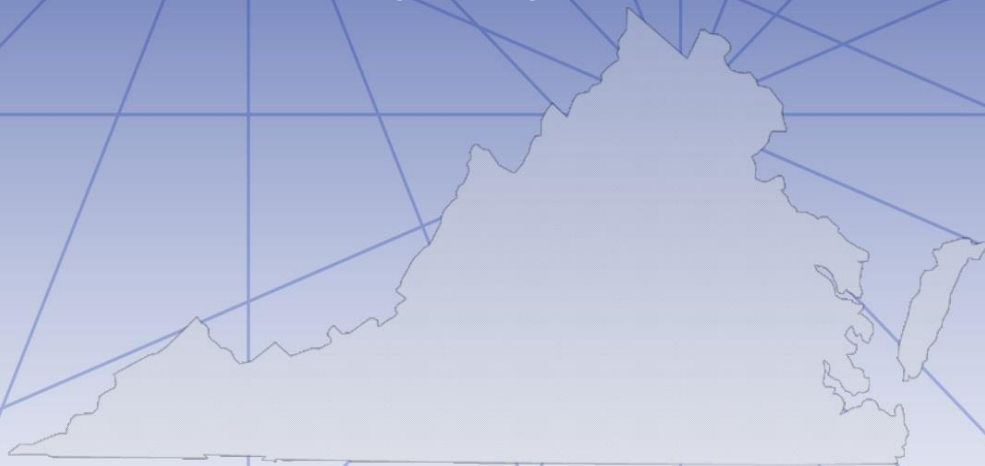| Type of Funding	Amount
Non-recurring	$1,238,763.50
Recurring (over 24 months)	$18,604.08
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Commonwealth of Virginia
Next Generation 9-1-1

Proposal Acceptance Letter
(PAL)

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program.   Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: Mecklenburg County Emergency Communications

CONTACT TITLE: Director

CONTACT FIRST NAME: Ben

CONTACT LAST NAME: Duncan

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Financial Information

Amount Requested: $1,276,275.88

Date of Completed Migration Proposal: November 1, 2018

PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

X☐ Yes   ☐ No

Virginia Information Technologies Agency

VITA

9-1-1

Commonwealth of Virginia
Next Generation 9-1-1

King William County
PSAP/GIS Specific
NG9-1-1 Migration Proposal

Executive Summary

This migration proposal is being prepared for the **King William County PSAP** based on the Fairfax County contract with **AT&T**. **Loretta Collier** shall be the primary contacts.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A Migration Proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the **King William County PSAP** will need to have i3-capable call handling equipment in place that has been approved on the AT&T ESInet™ to be able to implement the full NENA i3 standard without the need for any interim or transitional steps. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at: https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: **Motorola**
- CHE model: **Vesta**
- CHE version number (clients): **4.3.0.331**
- CHE version number (server): **4.3**
- CHE maintenance provider (channel): **Radio Communications of Virginia**
- CHE Geodiversity: **No**
- Number of positions: **4**
- SIP capable: **No**

This CHE will require an upgrade to Vesta 7.2 to implement the full i3 interface. This upgrade will require the purchase of two firewalls to connect to the ESInet. However, if the PSAP deploys text to 9-1-1 with the direct IP solution prior to NG9-1-1 migration, these firewalls will already have been purchased and can be used for both purposes.

The PSAP indicates the planned replacement of their CHE in **October 2019**. This is during the planned NG9-1-1 migration. Any new CHE will need to be tested and i3 functional on the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. The PSAP has not yet deployed text to 9-1-1. Since their deployment for NG9-1-1 is scheduled before the new deadline for text to 9-1-1 deployment, they will deploy it with NG9-1-1 as a direct IP service integrated with their CHE. The cost to implement this will be covered by the Board.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: **ID Networks**
- CAD software version: **ID Dispatch 3.4.194.0**
- CAD interfaces: **Yes**
- Method of data transfer: **Serial**

This CAD system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: **ID Networks (integrated with CAD)**
- Dispatch Mapping Software Version: **3.4.194**
- Method of data transfer: **Serial**

This mapping display system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: **NICE**
- Logging Recorder Model:
- Logging Recorder Software Version: **5.1.0.131** (pending an upgrade)
- Audio Origination Point: **Both trunk-based and position-based**

It is important to note that with an IP connection, audio is not present on the circuit until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio message is played for the caller (which technically requires the CHE to answer the call to play the message). This voice logging recorder system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Data Analytics

Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: **ECaTS**
- Data Analytics Vendor: Motorola and **ECaTS**

All required upgrades to ECaTS will be handled through the statewide contract at no cost to the PSAP.

Outcall Notification Systems

The PSAP currently has **Everbridge** as their outcall notification system. AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications

No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space

The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP has confirmed that this space is currently or will be available.

Coordination with Open Grants

The PSAP currently has one open grant:

1. **FY18 – NG9-1-1 GIS –Shared Services grant participant - $515,728.86**
2. **FY19 – NG9-1-1 GIS – Shared Services grant participant – $32,075.00**

To ensure the grant funds support the migration to NG9-1-1, the PSAP should, to the extent practical, use funding from the FY18 regional GIS grant to correct geospatial issues identified in the following section.

GIS Data Preparation

GIS Data Sources

Currently, the **King William County GIS** maintains all of the GIS data for the PSAP and will be the source for all GIS data required for NG9-1-1 geospatial routing; however, other departments within the locality may contribute data or manage various processes. It is the responsibility of the **King William County GIS** to aggregate the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness

Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met,

the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is recommending the additional goal of matching 98% of ALI database addresses when geocoded against the address point data layer. If either of these goals in not achieved, then GIS data work must be completed to meet or exceed these goals. While financial support from the PSAP grant program may be available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline (RCL) – **95.0%**
- Address Point – **70.0%**

The primary issue with the RCL data is differences in street names between the ALI and GIS data. Correcting the street names so they match would increase the match rate for RCL to **97.1%**. The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to **92.8%**. During July 2018, VITA will send each PSAP and/or GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place:

1. **Add a record to the GIS** – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. **Change attribution in the GIS** – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.
3. **Change attribution in the ALI database** – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.
4. **Determine that the discrepancy is not an error** – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While many of those records were filtered out of the analysis, some may still be within the

data. These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty when routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in two or more matches. Since certainty of a location is important, checks are performed to ensure no duplicate data exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - **87**
- Road centerline has right or left side overlapping address range - **537**
- Road centerline has street name attributes not meeting Virginia, USPS, & NENA standard - **1**
- Address point Is duplicate, has no street name, or no address number - **11**
- Address point street name and road centerline street name mismatch - **12**

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Regardless of how they are resolved, **King William County** will need to resolve these issues through internal resources, at least 3 months prior to the targeted deployment date.

PSAP Boundary

This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary

This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Making sure there is agreement of that point and ensuring each locality is only providing data where they are the authoritative GIS data source are the purpose of this assessment. External edge-matching conformance addresses boundaries between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. Geometric features need to meet at the agreed upon boundary.

MSAG transition/confirmation

In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution. While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is a better solution since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG, an emergency service number (ESN) data layer must exist or be created. The PSAP has **an unknown number of ESNs** for their area of responsibility. **King William County GIS** does not maintain an ESN

boundary layer depicting this area. If there is only one ESN, then the ESN boundary would be coincident with the PSAP boundary and both can be created at the same time. If more than one ESN is needed, then an ESN boundary layer will need to be created. Once it is, they can utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not part of a locality's existing maintenance workflow or GIS database, they can be created by building a separate polygon layer and transferring these values to the centerline segments (commonly referred to as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing updated GIS data. Localities wishing to use existing tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to accept and resolve discrepancy calls (formalized requests to update GIS datasets), and periodically transfer updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important that localities document GIS data maintenance workflows and validations to ensure synchronization across GIS layers. This can include periodically ensuring conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use and the CHE is i3 capable.

The two interim solutions are as follows:

> **Legacy PSAP Gateway** - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This

does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

Transitional SIP - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: **Verizon**
- ALI database provider: **Verizon**
- Selective router pair(s): **Chester/Richmond Stuart**
- Trunk counts (all): **16**
    - Wireline: **4**
    - Wireless: **4**
    - SIP: **0**
    - Administrative: **8**

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be discussed with AT&T during system configuration. The options include providing the caller with a fast

busy signal, routing the call to another PSAP, or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant connections follow different paths that never touch from origin to destination. To achieve the 99.999% availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP and the results for the current location of the **King William County** PSAP are as follows:

Fig 27
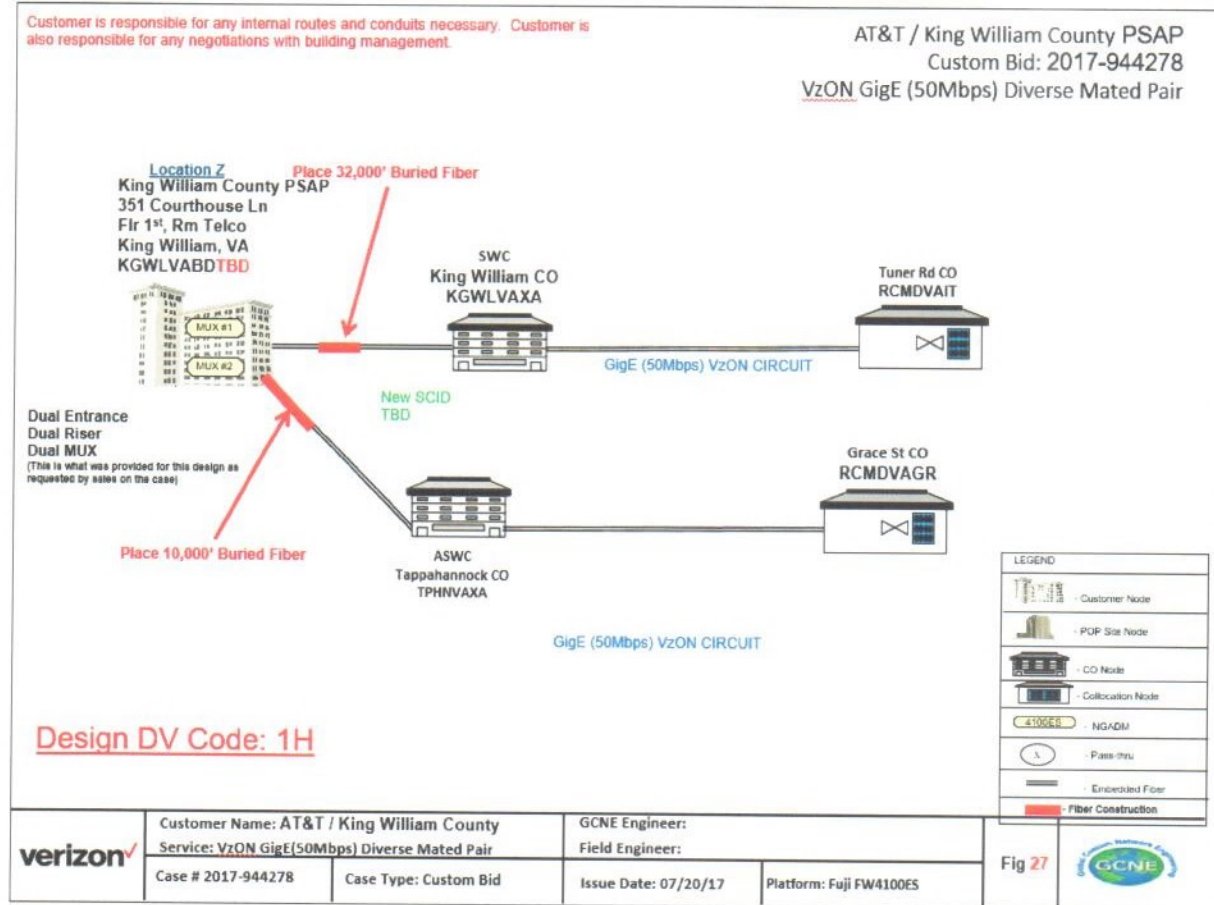
The total cost for this diverse connectivity is **$618,267.47** which will be provided by the Board as part of the PSAP's funding submission. The timing of the implementation of the diverse connectivity may not be completed until after initial NG9-1-1 deployment.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP has a disaster recovery plan, which states that if the PSAP must be evacuated for any reason, or if the 9-1-1 network is unavailable and the PSAP can still be occupied, calls are routed to **King and Queen County and/or New Kent County**.

Based on the current disaster recovery plan, no additional steps must be taken in order for this plan to continue to be viable with NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP
There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security
AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality
- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than

supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.
- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	**Verizon**	**1,660,182**	**January 2020 – June 2020**
Charlottesville/Farmville	CenturyLink	403,369	July 2020 – December 2020
Fredericksburg/Winchester	Verizon	343,031	July 2020 – December 2020
Danville/Lynchburg Church St	Verizon	320,247	July 2020 – December 2020
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	TDS Telecom	5,158	January 2021 – June 2021
Floyd County	Citizens	15,651	January 2021 – June 2021
Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021

Johnson City/Wytheville	CenturyLink	338,311	July 2021 – December 2021

The **King William County PSAP's** deployment window will be **January 2020 – June 2020**. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least **three months** before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4,000	Flat rate from AT&T
CHE replacement	$150,000	Replacement in FY20
CHE upgrade	$30,000	i3 deployment services
Text-to-911	$30,000	Not currently deployed
CAD upgrade	$0	Not required
Mapping upgrade	$0	Not required
Voice logging upgrade	$0	Not required
ECaTS Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$0	Not required
Rack space	$0	Rack space is available
Diverse connectivity costs	$618,267.47	
Disaster recovery upgrade	$0	Not required
Secondary PSAPs	$0	None
GIS data preparation	$0	Currently using grant funds
Legacy 9-1-1 transition costs	$1,076.70	Verizon costs
Project management assistance	$0	None requested
Total	$834,344.17	

The monthly recurring cost for the AT&T solution is **$4,416.96** which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately **$1,441.96**. The estimated monthly increase to the PSAP after deployment is approximately **$2,975**. This increase will be covered by the Board for a period of 24 months after deployment is complete. At the end of this period, the entire cost will be the responsibility of the PSAP. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding

The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:

Type of Funding	Amount
Non-recurring	$834,344.17
Recurring (over 24 months)	$71,400.00
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Virginia Information Technologies Agency

VITA

9-1-1

Commonwealth of Virginia
Next Generation 9-1-1

Proposal Acceptance Letter

(PAL)

www.vita.virginia.gov

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program. Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: King William County Sheriffs Office

CONTACT TITLE: Records Manager

CONTACT FIRST NAME: Loretta

CONTACT LAST NAME: Collier

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CONTACT FAX NUMBER: 804-769-0334

Financial Information

Amount Requested: $ **905,744.17**

Date of Completed Migration Proposal: ~~9/1/2018~~ 11/1/2018 nw

PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

☒ Yes   ☐ No

Virginia Information Technologies Agency

**Commonwealth of Virginia
Next Generation 9-1-1**

**City of Hopewell
PSAP/GIS Specific
NG9-1-1 Migration Proposal**

Executive Summary

This migration proposal is being prepared for the **City of Hopewell PSAP** based on the Fairfax County contract with **AT&T**. **Kim Parson** shall be the primary contacts.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A Migration Proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the **City of Hopewell PSAP** will need to have i3-capable call handling equipment in place that has been approved on the AT&T ESInet™ to be able to implement the full NENA i3 standard without the need for any interim or transitional steps. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at: https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: **Motorola**
- CHE model: **Vesta**
- CHE version number (clients): **6.1**
- CHE version number (server): **6.1**
- CHE maintenance provider (channel): **Carousel Industries**
- CHE Geodiversity: **No**
- Number of positions: **3**
- SIP capable: **Yes**

This CHE will require an upgrade to Vesta 7.2 to implement the full i3 interface. This upgrade will require the purchase of two firewalls to connect to the ESInet. However, if the PSAP deploys text to 9-1-1 with the direct IP solution prior to NG9-1-1 migration, these firewalls will already have been purchased and can be used for both purposes.

The PSAP indicates the planned replacement of their CHE in **March 2022**. This is after the planned NG9-1-1 migration. Any new CHE will need to be tested and i3 functional on the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. The PSAP has not yet deployed text to 9-1-1. Since their deployment for NG9-1-1 is scheduled before the new deadline for text to 9-1-1 deployment, they will deploy it with NG9-1-1 as a direct IP service integrated with their CHE. The cost to implement this will be covered by the Board.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: **OSSI**
- CAD software version: **One Solution CAD**
- CAD interfaces: **Yes**
- Method of data transfer: **Serial**

This CAD system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: **OSSI (integrated with CAD)**
- Dispatch Mapping Software Version:
- Method of data transfer: **Serial**

This mapping display system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: **Revcord**
- Logging Recorder Model:
- Logging Recorder Software Version: 8
- Audio Origination Point: **Both trunk-based and position-based**

It is important to note that with an IP connection, audio is not present on the circuit until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio message is played for the caller (which technically requires the CHE to answer the call to play the message). This voice logging recorder system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Data Analytics

Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: **Vesta Analytics v3 and ECaTS**
- Data Analytics Vendor: **Motorola and ECaTS**

Vesta Analytics has been determined to not require any upgrade or modification with the deployment of NG9-1-1 if it is upgraded with the CHE upgrade. All required upgrades to ECaTS will be handled through the statewide contract at no cost to the PSAP.

Outcall Notification Systems

The PSAP currently does not have an outcall notification system. If one is put in place, AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications

No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space

The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP has confirmed that this space is currently or will be available.

Coordination with Open Grants

The PSAP currently has three open grants:

1. **FY18 – NG9-1-1 GIS - $58,465**

To ensure the grant funds support the migration to NG9-1-1, the PSAP should, to the extent practical, use funding from the FY18 regional GIS grant to correct geospatial issues identified in the following section.

GIS Data Preparation

GIS Data Sources

Currently, the **City of Hopewell GIS** maintains all of the GIS data for the PSAP and will be the source for all GIS data required for NG9-1-1 geospatial routing; however, other departments within the locality may contribute data or manage various processes. It is the responsibility of the **City of Hopewell GIS** to aggregate the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness

Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used

by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met, the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is recommending the additional goal of matching 98% of ALI database addresses when geocoded against the address point data layer. If either of these goals in not achieved, then GIS data work must be completed to meet or exceed these goals. While financial support from the PSAP grant program may be available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline (RCL) – **96.5%**
- Address Point – **91.0%**

The primary issue with the RCL data is differences in street names between the ALI and GIS data. Correcting the street names so they match would increase the match rate for RCL to **99.2%**. The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to **95.1%**. During July 2018, VITA will send each PSAP and/or GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place:

1. **Add a record to the GIS** – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. **Change attribution in the GIS** – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.
3. **Change attribution in the ALI database** – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.
4. **Determine that the discrepancy is not an error** – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While

many of those records were filtered out of the analysis, some may still be within the data. These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty when routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in two or more matches. Since certainty of a location is important, checks are performed to ensure no duplicate data exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - **1,185**
- Road centerline has right or left side overlapping address range - **2**
- Road centerline has street name attributes not meeting Virginia, USPS, & NENA standard - **73**
- Address point Is duplicate, has no street name, or no address number - **76**
- Address point street name and road centerline street name mismatch - **230**

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Regardless of how they are resolved, **City of Hopewell** will need to resolve these issues through internal resources, at least 3 months prior to the targeted deployment date.

PSAP Boundary

This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary

This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Making sure there is agreement of that point and ensuring each locality is only providing data where they are the authoritative GIS data source are the purpose of this assessment. External edge-matching conformance addresses boundaries between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. Geometric features need to meet at the agreed upon boundary.

MSAG transition/confirmation

In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution. While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is a better solution since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG,

an emergency service number (ESN) data layer must exist or be created. The PSAP has **one ESN** for their area of responsibility. **City of Hopewell GIS** does not maintain an ESN boundary layer depicting this area. Since this layer, and the PSAP boundary layer, are the same as the city boundary they will utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not part of a locality's existing maintenance workflow or GIS database, they can be created by building a separate polygon layer and transferring these values to the centerline segments (commonly referred to as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing updated GIS data. Localities wishing to use existing tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to accept and resolve discrepancy calls (formalized requests to update GIS datasets), and periodically transfer updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important that localities document GIS data maintenance workflows and validations to ensure synchronization across GIS layers. This can include periodically ensuring conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use and the CHE is i3 capable.

The two interim solutions are as follows:

> **Legacy PSAP Gateway** - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This

does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

Transitional SIP - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: **Verizon**
- ALI database provider: **Verizon**
- Selective router pair(s): **Chester/Richmond Stuart**
- Trunk counts (all): **10**
    - Wireline: **4**
    - Wireless: **4**
    - SIP: **0**
    - Administrative: **2**

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be

discussed with AT&T during system configuration. The options include providing the caller with a fast busy signal, routing the call to another PSAP, or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant connections follow different paths that never touch from origin to destination. To achieve the 99.999% availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP and the results for the current location of the **City of Hopewell** PSAP are as follows:
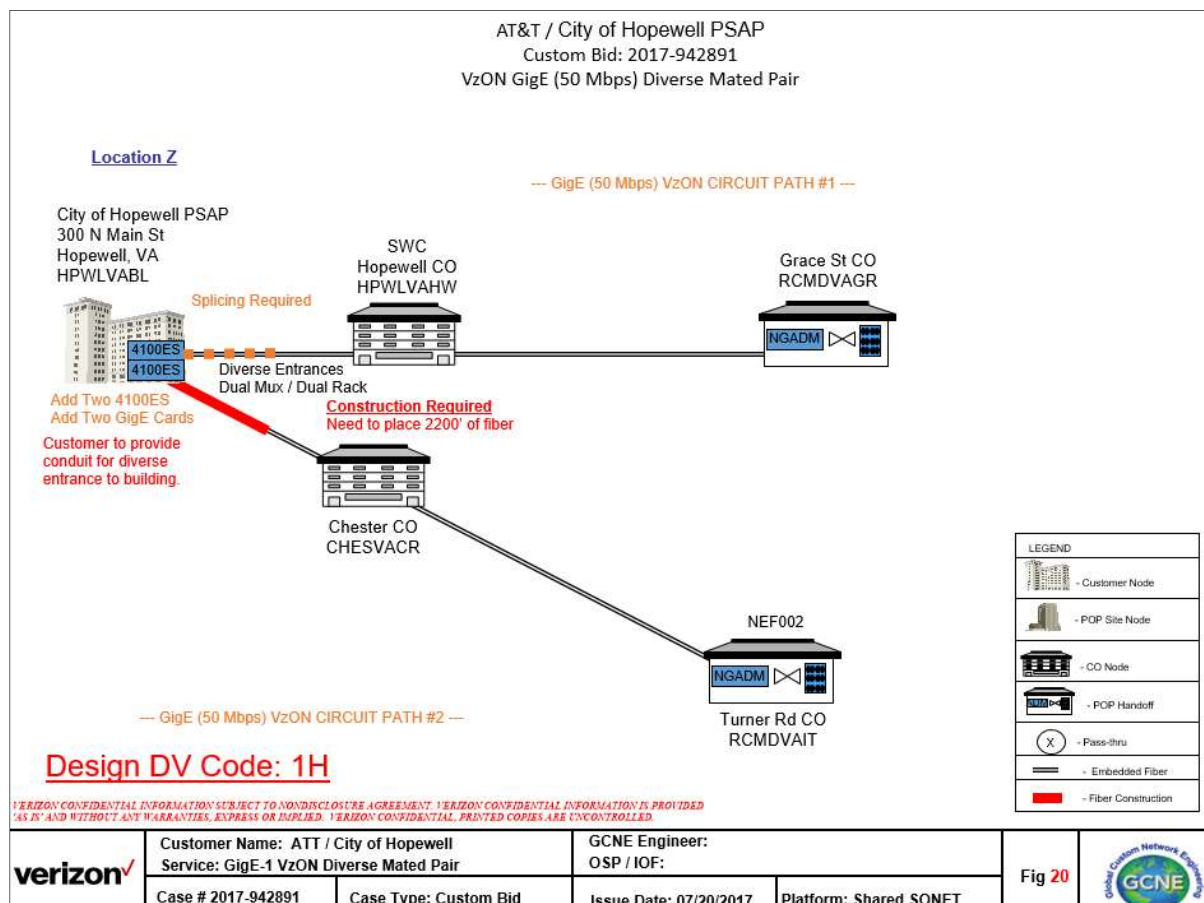
The total cost for this diverse connectivity is **$24,464.29** (PSAP will move to new building at 150 W. Randolph, in March 2019, which may impact costs), which will be provided by the Board as part of the PSAP's funding submission. The timing of the implementation of the diverse connectivity may not be completed until after initial NG9-1-1 deployment.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still

operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP has a disaster recovery plan, which states that if the PSAP must be evacuated for any reason, or if the 9-1-1 network is unavailable and the PSAP can still be occupied, calls are routed to the **Prince George County PSAP**.

Based on the current disaster recovery plan, no additional steps must be taken in order for this plan to continue to be viable with NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP
There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security
AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality
- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.
- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	**Verizon**	**1,660,182**	**January 2020 – June 2020**
Charlottesville/Farmville	CenturyLink	403,369	July 2020 – December 2020
Fredericksburg/Winchester	Verizon	343,031	July 2020 – December 2020
Danville/Lynchburg Church St	Verizon	320,247	July 2020 – December 2020
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	TDS Telecom	5,158	January 2021 – June 2021
Floyd County	Citizens	15,651	January 2021 – June 2021

Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021
Johnson City/Wytheville	CenturyLink	338,311	July 2021 – December 2021

The **City of Hopewell PSAP's** deployment window will be **January 2020 – June 2020**. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least **three months** before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4,000	Flat rate from AT&T
CHE upgrade	$30,000	i3 licenses and services
CHE replacement	$150,000	Replacement planned for FY22
Text-to-911	$30,000	Integrated text solution
CAD upgrade	$0	Not required
Mapping upgrade	$0	Not required
Voice logging upgrade	$0	Not required
ECaTS Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$2,000	Rack space may not be available
Rack space	$0	
Diverse connectivity costs	$24,464.29	May change with their move
Disaster recovery upgrade	$0	Not required
Secondary PSAPs	$0	None
GIS data preparation	$0	
Legacy 9-1-1 transition costs	$1,949.70	Verizon costs
Project management assistance	$0	None requested
Total	$243,413.99	

The monthly recurring cost for the AT&T solution is **$5,225.83** which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately **$1,742.78**. The estimated monthly increase to the PSAP after deployment is approximately **$3,483.05**. This increase will be covered by the Board for a period of 24 months after deployment is complete. At the end of this period, the entire cost will be the responsibility of the PSAP. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current

monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding

The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:
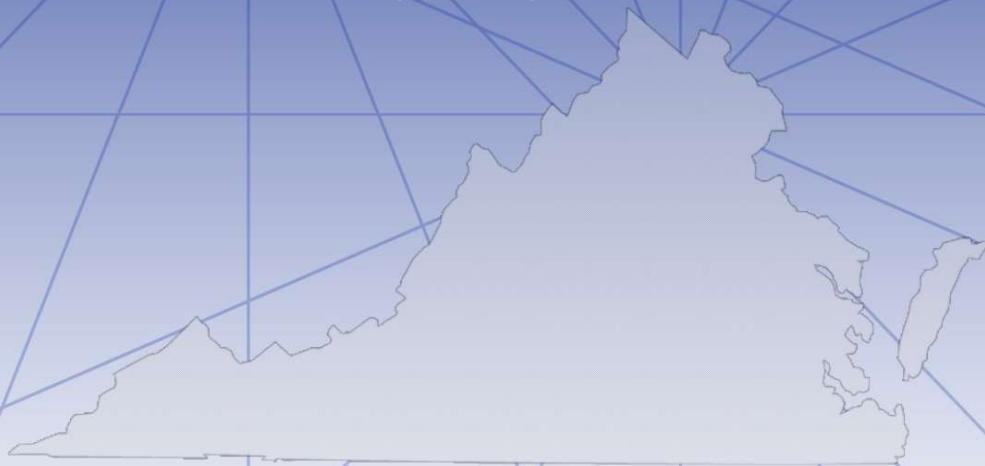
Type of Funding	Amount
Non-recurring	$243,413.99
Recurring (over 24 months)	$83,593.20
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Commonwealth of Virginia
Next Generation 9-1-1

Proposal Acceptance Letter
(PAL)

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program.   Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: Hopewell PSAP

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Financial Information

Amount Requested: $ 327,007.19

Date of Completed Migration Proposal: November 1, 2018

PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

☒ Yes   ☐ No

Commonwealth of Virginia
Next Generation 9-1-1

City of Danville
PSAP/GIS Specific
Migration Proposal

Executive Summary

This migration proposal is being prepared for the **City of Danville** based on the Fairfax County contract with **AT&T**. **Michael Gobble** shall be the primary contact.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A Migration Proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the **Danville PSAP** will be able to implement the full NENA i3 standard without the need for any interim or transitional steps. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at:

https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: **Motorola**
- CHE model: **Vesta**
- CHE version number (clients): **6.1 Build 394**
- CHE version number (server): **6.1 Build 340**
- CHE maintenance provider (channel): **Mobile Communications of America**
- CHE Geodiversity: **No**
- Number of positions: **6**
- SIP capable: **Yes**

This CHE has been determined to be SIP capable, but will require an upgrade to version 7.2 to implement the full i3 interface. This upgrade will require the purchase of two firewalls to connect to the ESInet. However, if the PSAP deploys text to 9-1-1 with the direct IP solution prior to NG9-1-1 migration, these firewalls will already have been purchased and can be used for both purposes.

The PSAP indicates the plan replacement of their CHE in **August 2021**. This is after the planned NG9-1-1 migration. Any new CHE will need to be tested and i3 functional on the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. The City of Danville has deployed a TTY text to 9-1-1 solution, and therefore meets this legislative requirement. With the migration to NG9-1-1, Danville will need to convert their text to 9-1-1 solution to direct IP. The costs to implement this must be determined, but will be covered by the Board.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: **Superion**
- CAD software version: **One Solution CAD v18.0**
- CAD interfaces: **Yes**
- Method of data transfer: **Serial**

This CAD system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: **Superion**
- Dispatch Mapping Software Version: **One Solution CAD v18.0**
- Method of data transfer: **Serial through CAD**

This mapping display system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: **Eventide**
- Logging Recorder Model: **NexLog**
- Logging Recorder Software Version: **2.7.0**
- Audio Origination Point: **Both**

It is important to note that with an IP connection, audio is not present on the circuit until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio message is played for the caller (which technically requires the CHE to answer the call to play the message). This voice logging recorder system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Data Analytics

Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: **ECaTS**
- Data Analytics Vendor: **ECaTS, currently also has Airbus Aurora v3.2**

Any necessary upgrades to Aurora will be the responsibility of the PSAP. To reduce their costs, the PSAP may want to consider fully utilizing ECaTS. All required upgrades to ECaTS will be handled through the statewide contract at no cost to the PSAP.

Outcall Notification Systems

The PSAP currently uses **Vesta Alert** as their outcall notification system. AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications

No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space

The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP has confirmed that this space is currently or will be available.

Coordination with Open Grants

The PSAP currently has no open grants.

GIS Data Preparation

GIS Data Sources

Currently, at the **City of Danville**, GIS data is maintained by individual departments, who are responsible for their respective GIS data layers. **Danville GIS** is then responsible for compiling the data from all the individual departments and providing it to the PSAP. Therefore, it will be the responsibility of the **Danville GIS** department to provide the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness

Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met, the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is recommending the additional goal of matching 98% of ALI database addresses when geocoded against the address point data layer. If either of these goals in not achieved, then GIS data work must be completed to meet or exceed these goals. While financial support from the PSAP grant program may be

available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline – **98.9%**
- Address Point – **98.4**

The **City of Danville** currently meets both goals. If they desire a greater match rate, there are some differences in street names between the ALI and GIS data. Correcting the street names so they match would increase the match rate for RCL to **99.4%**. The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to **98.9%**. During July 2018, VITA will send each PSAP and/or GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place:

1. **Add a record to the GIS** – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. **Change attribution in the GIS** – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.
3. **Change attribution in the ALI database** – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.
4. **Determine that the discrepancy is not an error** – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While many of those records were filtered out of the analysis, some may still be within the data. These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty when

routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in two or more matches. Since certainty of a location is important, checks are performed to ensure no duplicate data exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - **18**
- Road centerline has right or left side overlapping address range - **119**
- Road centerline has street name attributes not meeting Virginia, USPS, & NENA standard - **5**
- Address point Is duplicate, has no street name, or no address number - **20**
- Address point street name and road centerline street name mismatch - **23**

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Though the **City of Danville** currently meets the goal, this must be maintained using internal resources to the targeted deployment date.

PSAP Boundary

This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary

This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Making sure there is agreement of that point and ensuring each locality is only providing data where they are the authoritative GIS data source are the purpose of this assessment. External edge-matching conformance addresses boundaries between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. Geometric features need to meet at the agreed upon boundary.

MSAG transition/confirmation

In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution. While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is a better solution since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG, an emergency service number (ESN) data layer must exist or be created. The PSAP has one ESN for their area of responsibility. **City of Danville GIS** maintains an ESN boundary layer depicting this area so they will utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not part of a locality's existing maintenance workflow or GIS database, they can be created by building a

separate polygon layer and transferring these values to the centerline segments (commonly referred to as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

GIS Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing updated GIS data. Localities wishing to use existing tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to accept and resolve discrepancy calls (formalized requests to update GIS datasets), and periodically transfer updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important that localities document GIS data maintenance workflows and validations to ensure synchronization across GIS layers. This can include periodically ensuring conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use and the CHE is i3 capable.

The two interim solutions are as follows:

> **Legacy PSAP Gateway** - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

> **Transitional SIP** - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to

the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: **Verizon**
- ALI database provider: **Verizon**
- Selective router pair(s): **Danville/Lynchburg**
- Trunk counts (all): **20**
    - Wireline: **6**
    - Wireless: **6**
    - VOIP Trunks**: 0**
    - SIP: **0**
    - Administrative: **8**

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be discussed with AT&T during system configuration. The options include providing the caller with a fast busy signal, routing the call to another PSAP, or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal, or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant

connections follow different paths that never touch from origin to destination. To achieve the 99.999% availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP and the results for the current location of the **City of Danville** PSAP are as follows:
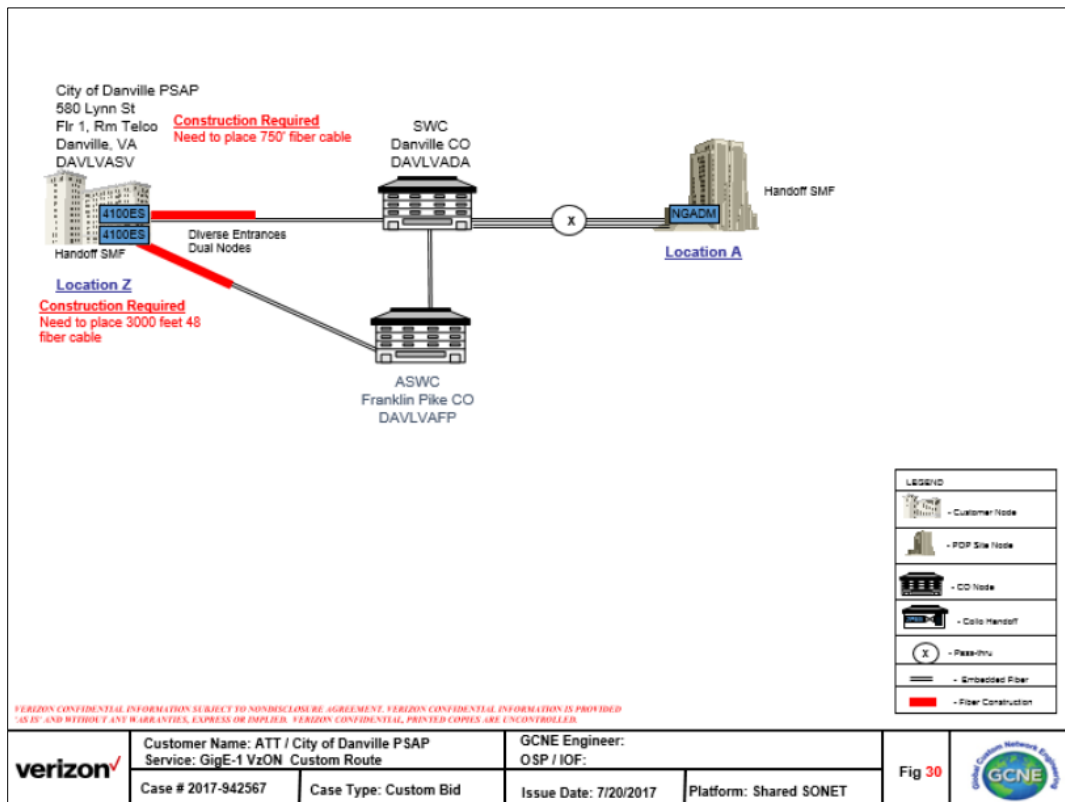
The total cost for this diverse connectivity is **$38,734.52**, which will be provided by the Board as part of the PSAP's funding submission. The timing of the implementation of the diverse connectivity may not be completed until after initial NG9-1-1 deployment.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP has a disaster recovery plan, which states that if the PSAP must be evacuated for any reason, the calls all transferred to the Pittsylvania County PSAP. Should just the network be unavailable and the PSAP can still be occupied, calls are rerouted to a 10-digit number within the PSAP.

Based on the current disaster recovery plan, no additional steps must be taken in order for this plan to continue to be viable with NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP

There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security

AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality
- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.

- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	Verizon	1,660,182	January 2020 – June 2020
Charlottesville/Farmville	CenturyLink	403,369	July 2020 – December 2020
Fredericksburg/Winchester	Verizon	343,031	July 2020 – December 2020
Danville/Lynchburg Church St	**Verizon**	**320,247**	**July 2020 – December 2020**
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	TDS Telecom	5,158	January 2021 – June 2021
Floyd County	Citizens	15,651	January 2021 – June 2021
Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021
Johnson City/Wytheville	CenturyLink	338,311	July 2021 – December 2021

The **City of Danville PSAP's** deployment window will be **July 2020 – December 2020**. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least **three months** before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4,000	Flat rate from AT&T
CHE replacement	$150,000	Replacement in August 2021
CHE upgrade	$30,000	i3 licenses and services
Text to 9-1-1	$30,000	Conversion to direct IP
CAD upgrade	$0	Not required
Mapping upgrade	$0	Not required
Voice logging upgrade	$0	Not required
ECaTS Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$0	Not required
Rack space	$0	Not required
Diverse connectivity costs	$38,734.52	
Disaster recovery upgrade	$0	Not required
Secondary PSAPs	$0	None
GIS data preparation	$0	None
Legacy 9-1-1 transition costs	$4,277.70	Verizon costs
Project management assistance	$0	None requested
Total	$258,012.22	

The monthly recurring cost for the AT&T solution is **$6,888.64**, which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately **$2,106.48**. The estimated monthly increase to the PSAP after deployment is approximately **$4,782.16**. This increase will be covered by the Board for a period of 24 months after deployment is complete. At the end of this period, the entire cost will be the responsibility of the PSAP. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding

The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines

approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:

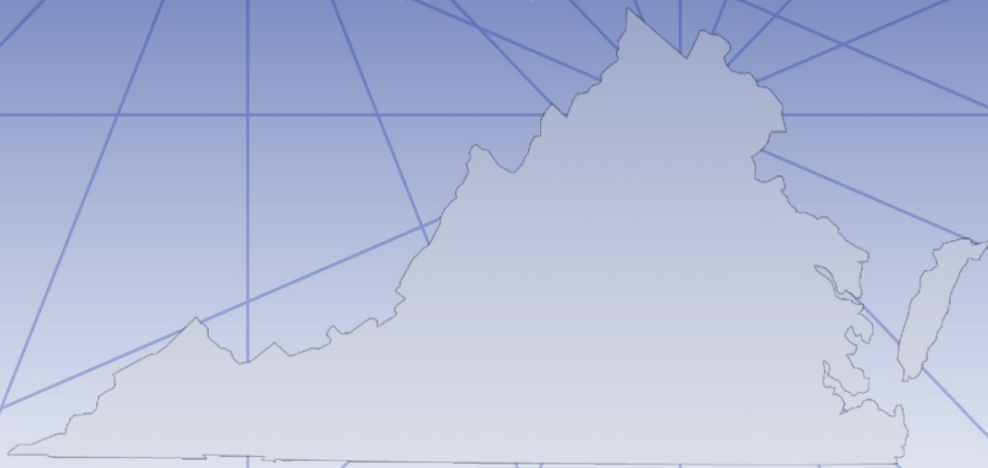| Type of Funding	Amount
Non-recurring	$258,012.22
Recurring (over 24 months)	$114,771.84
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Commonwealth of Virginia
Next Generation 9-1-1

Proposal Acceptance Letter
(PAL)

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program.   Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: City of Danville

CONTACT TITLE: 911 Emergency Communications Manager

CONTACT FIRST NAME: Michael

CONTACT LAST NAME: Gobble

ADDRESS 1: 600 Lynn Street

ADDRESS 2:

CITY: Danville

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CONTACT EMAIL: Michael.Gobble@danvilleva.gov

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CONTACT FAX NUMBER: 434.797.8943

Financial Information

Amount Requested: $ 372,784.06

Date of Completed Migration Proposal: 11/01/2018

PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

☒ Yes   ☐ No

Commonwealth of Virginia
Next Generation 9-1-1

Craig County
PSAP/GIS Specific
NG9-1-1 Migration Proposal

www.vita.virginia.gov

Executive Summary

This migration proposal is being prepared for the **Craig County PSAP** based on the Fairfax County contract with **AT&T**. **Robert Wrzosek** shall be the primary contact.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A Migration Proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the **Craig County PSAP** will need to upgrade their current Viper software or have in place an i3 functional CHE that has been approved on the AT&T ESInet™ to be able to implement the full NENA i3 standard without the need for any interim or transitional steps. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at: https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: **West**
- CHE model: **Viper**
- CHE version number (clients): **Power911 v5.5 SP4**
- CHE version number (server): **Viper v5.0**
- CHE maintenance provider (channel): **West**
- CHE Geodiversity: **No**
- Number of positions: **2**
- SIP capable: **Yes**

This CHE will require an upgrade to Viper 5.1 and Power911 6.4 to implement the full i3 interface. This upgrade will require the purchase of two firewalls to connect to the ESInet. However, if the PSAP deploys text to 9-1-1 with the direct IP solution prior to NG9-1-1 migration, these firewalls will already have been purchased and can be used for both purposes.

The PSAP indicates the planned replacement of their CHE in **July 2022**. This is after their planned NG9-1-1 migration. Any new CHE will need to be tested and i3 functional on the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. The PSAP has not yet deployed text to 9-1-1. Since their deployment for NG9-1-1 is scheduled just after the new deadline for text to 9-1-1 deployment, they will need to consider how to deploy before the deadline. The web-based service may be an option until the direct IP service integrated with their CHE can be deployed with NG9-1-1. The cost to implement this will be covered by the Board.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: **Southern Software**
- CAD software version: **17.4.233.28**
- CAD interfaces: **Yes**
- Method of data transfer: **Serial**

This CAD system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: **Southern Software (integrated with CAD)**
- Dispatch Mapping Software Version: **17.4.233.28**
- Method of data transfer: **Serial**

This mapping display system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: **RedBox Recorders**
- Logging Recorder Model:
- Logging Recorder Software
- Audio Origination Point:

It is important to note that with an IP connection, audio is not present on the circuit until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio message is played for the caller (which technically requires the CHE to answer the call to play the message). This voice logging recorder system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Data Analytics
Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: **ECaTS**
- Data Analytics Vendor: **ECaTS**

All required upgrades to ECaTS will be handled through the statewide contract at no cost to the PSAP.

Outcall Notification Systems
The PSAP currently does not have an outcall notification system. When on is in place, AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications
No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space
The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP has confirmed that this space is currently available.

Coordination with Open Grants
The PSAP does not currently have any open grants.

GIS Data Preparation

GIS Data Sources
Currently, **MSAG Data Consultants** maintains all of the GIS data for the PSAP and will be the source for all GIS data required for NG9-1-1 geospatial routing; however, other departments within the locality may contribute data or manage various processes. It is the responsibility of the **Craig County PSAP** to aggregate the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness
Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met, the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is recommending the additional goal of matching 98% of ALI database addresses when geocoded against the address point data layer. If either of these goals in not achieved, then GIS data work must be completed to meet or exceed these goals. While financial support from the PSAP grant program may be available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline (RCL) – **99.3%**
- Address Point – **96.5%**

Craig County already meets the goal for RCL. If they desire a higher match rate, there are differences in street names between the ALI and GIS data. Correcting the street names so they match would increase the match rate for RCL to **99.4%**. The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to **97.8%**. During July 2018, VITA will send each PSAP and/or GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place:

1. **Add a record to the GIS** – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. **Change attribution in the GIS** – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.
3. **Change attribution in the ALI database** – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.
4. **Determine that the discrepancy is not an error** – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While many of those records were filtered out of the analysis, some may still be within the data. These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty when routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in two or more matches. Since certainty of a location is important, checks are performed to ensure no

duplicate data exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - **0**
- Road centerline has right or left side overlapping address range - **2**
- Road centerline has street name attributes not meting Virginia, USPS, & NENA standard - **0**
- Address point Is duplicate, has no street name, or no address number - **1**
- Address point street name and road centerline street name mismatch - **0**

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Regardless of how they are resolved, **Craig County** will need to resolve these issues through external resources or through assistance of their VITA IPS GIS data analysts, at least three months prior to the targeted deployment date

PSAP Boundary

This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary

This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Making sure there is agreement of that point and ensuring each locality is only providing data where they are the authoritative GIS data source are the purpose of this assessment. External edge-matching conformance addresses boundaries between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. Geometric features need to meet at the agreed upon boundary.

MSAG transition/confirmation

In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution. While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is a better solution since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG, an emergency service number (ESN) data layer must exist or be created. The PSAP has **7 ESNs** for their area of responsibility. **Craig County** has an ESN boundary layer depicting this area so they will utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not part of a locality's existing maintenance workflow or GIS database, they can be created by building a separate polygon layer and transferring these values to the centerline segments (commonly referred to

as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

GIS Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing updated GIS data. Localities wishing to use existing tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to accept and resolve discrepancy calls (formalized requests to update GIS datasets), and periodically transfer updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important that localities document GIS data maintenance workflows and validations to ensure synchronization across GIS layers. This can include periodically ensuring conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use and the CHE is i3 capable.

The two interim solutions are as follows:

> **Legacy PSAP Gateway** - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

> **Transitional SIP** - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to

the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: **TDS Telecom**
- ALI database provider: **West**
- Selective router pair(s): **New Castle (TDS Telecom)**
- Trunk counts (all): **13**
    - Wireline: **5**
    - Wireless: **5**
    - SIP: **0**
    - Administrative: **3**

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be discussed with AT&T during system configuration. The options include providing the caller with a fast busy signal, routing the call to another PSAP, or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant connections follow different paths that never touch from origin to destination. To achieve the 99.999%

availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP. Unfortunately, the results for the current location of the **Craig County PSAP** are that diversity is not available. Redundant connectivity will instead be provided. If a diversity option becomes available in the future, the funding for such a solution could be provided by the Board as part of the PSAP's funding submission.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP does not have a disaster recovery plan for if the PSAP must be evacuated for any reason. Should just the network be unavailable and the PSAP can still be occupied, calls are rerouted to a **ten-digit number**.

Since they currently do not have a disaster recovery plan, the PSAP may want to concern implementing one with the migration to NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP

There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security

AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality
- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.
- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	Verizon	1,660,182	January 2020 – June 2020
Charlottesville/Farmville	CenturyLink	403,369	July 2020 – December 2020
Fredericksburg/Winchester	Verizon	343,031	July 2020 – December 2020
Danville/Lynchburg Church St	Verizon	320,247	July 2020 – December 2020
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	**TDS Telecom**	**5,158**	**January 2021 – June 2021**
Floyd County	Citizens	15,651	January 2021 – June 2021
Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021
Johnson City/Wytheville	CenturyLink	338,311	July 2021 – December 2021

The **Craig County PSAP's** deployment window will be **January 2021 – June 2021**. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least **three months** before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4,000	Flat rate from AT&T
CHE upgrade	$15,000	i3 licenses and services
Text-to-911	$15,000	Firewalls and professional services
CAD upgrade	$0	Not required
Mapping upgrade	$0	Not required
Voice logging upgrade	$0	Not required
ECaTS Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$0	Not required
Rack space	$0	Rack space is available
Diverse connectivity costs	$0	
Disaster recovery upgrade	$0	Not required
Secondary PSAPs	$0	None
GIS data preparation	$0	Not required

Legacy 9-1-1 transition costs	$552.90	
Project management assistance	$0	None requested
Total	$35,552.90	

The monthly recurring cost for the AT&T solution is **$3,263.21** which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately **$929.30**. The estimated monthly increase to the PSAP after deployment is approximately **$2,333.91**. This increase will be covered by the Board for a period of 24 months after deployment is complete. At the end of this period, the entire cost will be the responsibility of the PSAP. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding

The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:

Type of Funding	Amount
Non-recurring	$35,552.90
Recurring (over 24 months)	$56,013.84
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program.   Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional

funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: **Craig County Sheriff's Office**

CONTACT TITLE: **E911 Coordinator**

CONTACT FIRST NAME: **Robert**

CONTACT LAST NAME: **Wrzosek**

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ADDRESS 2:

CITY: **New Castle**

ZIP CODE: **24127**

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CONTACT FAX NUMBER: **(540) 864-5129**

Financial Information

Amount Requested: $ 91,566.74

Date of Completed Migration Proposal: 11/01/2018

PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

X Yes	No

Commonwealth of Virginia
Next Generation 9-1-1

Bath County
PSAP/GIS Specific
NG9-1-1 Migration Proposal

Executive Summary

This migration proposal is being prepared for the **Bath County PSAP** based on the Fairfax County contract with **AT&T**. **Teresa Philips** shall be the primary contact.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A Migration Proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the **Bath County PSAP** will need to upgrade their current Motorola CallWorks software or have in place an i3 functional CHE that has been approved on the AT&T ESInet™ to be able to implement the full NENA i3 standard without the need for any interim or transitional steps. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at: https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: **Motorola**
- CHE model: **CallWorks CallStation**
- CHE version number (clients): **4.3.2**
- CHE version number (server): **4.3.2**
- CHE maintenance provider (channel): **Motorola/Teltronics**
- CHE Geodiversity: **No**
- Number of positions: **3**
- SIP capable: **Yes**

This CHE will require an upgrade to implement the full i3 interface. This upgrade will require the purchase of two firewalls to connect to the ESInet. However, if the PSAP deploys text to 9-1-1 with the direct IP solution prior to NG9-1-1 migration, these firewalls will already have been purchased and can be used for both purposes.

The PSAP indicates the planned replacement of their CHE in **October 2022**. This is after their planned NG9-1-1 migration. Any new CHE will need to be tested and i3 functional on the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. The PSAP has not yet deployed text to 9-1-1. Since their deployment for NG9-1-1 is scheduled just after the new deadline for text to 9-1-1 deployment, they will need to consider how to deploy before the deadline. The web-based service may be an option until the direct IP service integrated with their CHE can be deployed with NG9-1-1. The cost to implement this will be covered by the Board.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: **Interact Public Safety Ssytems**
- CAD software version: **10.2.4.18438**
- CAD interfaces: **Yes**
- Method of data transfer: **Serial**

This CAD system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: **Interact and CallStation with Maps**
- Dispatch Mapping Software Version: **Interact GIS v5.14 and CallStation 4.3.2**
- Method of data transfer: **Serial**

This mapping display system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: **NICE**
- Logging Recorder Model: **Inform**
- Logging Recorder Software: **8.90.04.03**
- Audio Origination Point: **Trunks**

While the voice logging recorder system does not require any upgrade or modification with the deployment of NG9-1-1, if the PSAP wishes to maintain trunk-based recording, a span port will be provided by AT&T. The recording system may require an upgrade to receive and interpret the IP data. If desired, the cost of this upgrade would be covered by the Board. It is important to note that while this will allow audio to be pulled from the IP talk paths, it will not mirror current functionality. Currently, with analog trunks, trunk-based recording allows the audio to be captured before the call is answered by the call taker and the call is still in queue. With an IP connection, the audio is not present on the circuit

until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio message is played for the caller (which technically requires the CHE to answer the call to play the message). The PSAP can choose to convert to position-based recording and the Board will cover the cost of reconfiguration.

Data Analytics

Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: **ECaTS**
- Data Analytics Vendor: **ECaTS**

All required upgrades to ECaTS will be handled through the statewide contract at no cost to the PSAP.

Outcall Notification Systems

The PSAP currently uses **CodeRED** as their outcall notification system. AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications

No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space

The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP has confirmed that this space is currently available.

Coordination with Open Grants

The PSAP does not currently have any open grants.

GIS Data Preparation

GIS Data Sources

Currently, the **Timmons Group** maintains all of the GIS data for the PSAP and will be the source for all GIS data required for NG9-1-1 geospatial routing; however, other departments within the locality may contribute data or manage various processes. It is the responsibility of the **Bath County PSAP** to aggregate the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness

Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met, the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is recommending the additional goal of matching 98% of ALI database addresses when geocoded against

the address point data layer. If either of these goals in not achieved, then GIS data work must be completed to meet or exceed these goals. While financial support from the PSAP grant program may be available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline (RCL) – **99.1%**
- Address Point – **98.0%**

Bath County already meets both goals. If they desire a greater match rate, there are some differences in street names between the ALI and GIS data. Correcting the street names so they match would increase the match rate for RCL to **99.8%**. The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to **99.1%**. During July 2018, VITA will send each PSAP and/or GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place:

1. **Add a record to the GIS** – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. **Change attribution in the GIS** – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.
3. **Change attribution in the ALI database** – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.
4. **Determine that the discrepancy is not an error** – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While many of those records were filtered out of the analysis, some may still be within the data. These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty when routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in two or more matches. Since certainty of a location is important, checks are performed to ensure no duplicate data exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - **0**
- Road centerline has right or left side overlapping address range - **5**
- Road centerline has street name attributes not meeting Virginia, USPS, & NENA standard - **1**
- Address point Is duplicate, has no street name, or no address number - **8**
- Address point street name and road centerline street name mismatch - **20**

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Regardless of how they are resolved, **Bath County** will need to resolve these issues through external resources or through assistance of VITA, at least three months prior to the targeted deployment date

PSAP Boundary
This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary
This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Making sure there is agreement of that point and ensuring each locality is only providing data where they are the authoritative GIS data source are the purpose of this assessment. External edge-matching conformance addresses boundaries between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. Geometric features need to meet at the agreed upon boundary.

MSAG transition/confirmation
In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution. While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is a better solution since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG, an emergency service number (ESN) data layer must exist or be created. The PSAP has **13 ESNs** for their area of responsibility. **Bath County** has an ESN boundary layer depicting this area so they will utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not part of a locality's existing maintenance workflow or GIS database, they can be created by building a separate polygon layer and transferring these values to the centerline segments (commonly referred to as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

GIS Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing updated GIS data. Localities wishing to use existing tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to accept and resolve discrepancy calls (formalized requests to update GIS datasets), and periodically transfer updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important that localities document GIS data maintenance workflows and validations to ensure synchronization across GIS layers. This can include periodically ensuring conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use and the CHE is i3 capable.

The two interim solutions are as follows:

>**Legacy PSAP Gateway** - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

Transitional SIP - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: **Verizon/TDS Telecom**
- ALI database provider: **Verizon**
- Selective router pair(s): **New Castle (TDS Telecom)**
- Trunk counts (all): **13**
  - Wireline: **5**
  - Wireless: **5**
  - SIP: **0**
  - Administrative: **3**

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be discussed with AT&T during system configuration. The options include providing the caller with a fast busy signal, routing the call to another PSAP, or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant connections follow different paths that never touch from origin to destination. To achieve the 99.999% availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP. Unfortunately, it appears that diversity is not available to the current location of the **Bath County** PSAP. Additional options for redundancy and diversity will continue to be developed for consideration by the PSAP.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP has a disaster recovery plan that states if the PSAP must be evacuated for any reason calls are rerouted to the **Augusta County PSAP**. Should just the network be unavailable and the PSAP can still be occupied, calls are rerouted to a **ten-digit number**.

Based on the current disaster recovery plan, no additional steps must be taken in order for this plan to continue to be viable with NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP

There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security

AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality

- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.
- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established

for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	Verizon	1,660,182	January 2020 – June 2020
Charlottesville/Farmville	CenturyLink	403,369	July 2020 – December 2020
Fredericksburg/Winchester	Verizon	343,031	July 2020 – December 2020
Danville/Lynchburg Church St	Verizon	320,247	July 2020 – December 2020
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	**TDS Telecom**	**5,158**	**January 2021 – June 2021**
Floyd County	Citizens	15,651	January 2021 – June 2021
Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021
Johnson City/Wytheville	CenturyLink	338,311	July 2021 – December 2021

The **Bath County PSAP's** deployment window will be **January 2021 – June 2021**. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least **three months** before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4,000	Flat rate from AT&T
CHE upgrade	$15,000	i3 licenses and services
Text-to-911	$15,000	Firewalls and professional services
CAD upgrade	$0	Not required
Mapping upgrade	$0	Not required
Voice logging upgrade	$0	Not required
ECaTS Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$0	Not required
Rack space	$0	Rack space is available
Diverse connectivity costs	$147,380.44	
Disaster recovery upgrade	$0	Not required

Secondary PSAPs	$0	None
GIS data preparation	$0	Not required
Legacy 9-1-1 transition costs	$1,164.00	Verizon costs
Project management assistance	$0	None requested
Total	$183,544.44	

The monthly recurring cost for the AT&T solution is **$3,184.01** which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately **$3,311.33**. The estimated monthly savings to the PSAP after deployment is approximately **$127.32**. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding

The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:

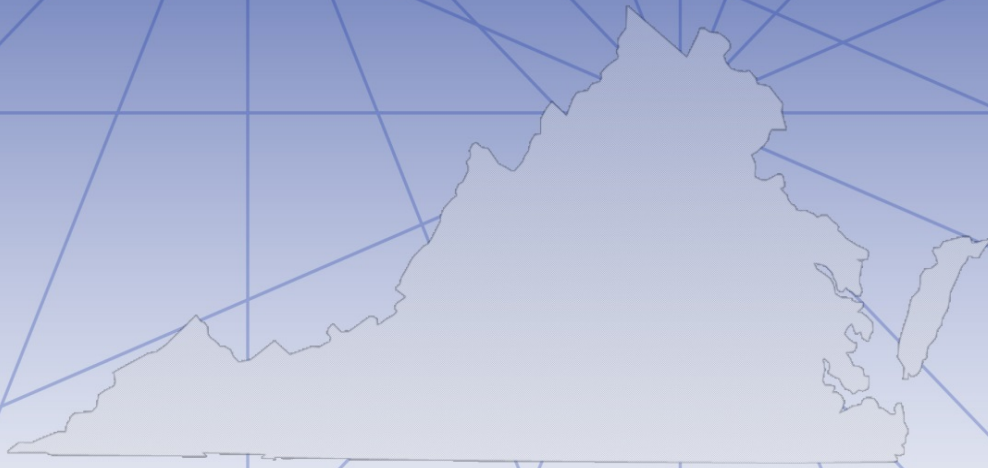| Type of Funding	Amount
Non-recurring	$183,544.44
Recurring (over 24 months)	$0
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Commonwealth of Virginia
Next Generation 9-1-1

Proposal Acceptance Letter

(PAL)

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program.   Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: Bath County Sheriff's Office / E911

CONTACT TITLE: Sergeant/E911 Administrator

CONTACT FIRST NAME: Teresa

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Financial Information

Amount Requested: $ $183,544.44

Date of Completed Migration Proposal: November 1, 2018

PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

☒ Yes   ☐ No

Commonwealth of Virginia
Next Generation 9-1-1

Amelia County
PSAP/GIS Specific
NG9-1-1 Migration Proposal

Executive Summary

This migration proposal is being prepared for the **Amelia County PSAP** based on the Fairfax County contract with **AT&T**. **Ranna Cope** shall be the primary contact.

The Commonwealth has been discussing and planning for next generation 9-1-1 (NG9-1-1) for nearly a decade. With significant advances of the technology, capabilities and functionality of an NG network, now is the time to move from planning to implementation. The question is not if the Commonwealth should deploy NG9-1-1, but rather, how should the Commonwealth deploy NG9-1-1. There is no option for not deploying it. Since 9-1-1 is a local service, it is up to each locality to determine how they will move forward with NG9-1-1 deployment. To aid that decision, the 9-1-1 Services Board (the Board) adopted the Virginia NG9-1-1 Deployment Plan in January 2018. That plan proposed the methodology and process to guide the 9-1-1 Services Board and Commonwealth as a whole, through this deployment. Fortunately, localities in the Commonwealth are able to leverage a project in Northern Virginia for both lessons learned and a procurement vehicle that will make the process significantly easier. Though the Board is recommending the Fairfax County contract with AT&T for NG9-1-1 services since it was awarded through a competitive process, each locality will need to determine the most appropriate path. The Board and VITA are positioned to provide assistance, and to assure a seamless, unified network.

Regardless of the locality's decision, all stakeholders in the 9-1-1 ecosystem must work together on deployment. A primary goal of NG9-1-1 is to ensure calls and information received in one locality can be transferred to any surrounding locality even if it is to another state. Accomplishing that will require continual coordination, communications and cooperation among the stakeholders throughout the deployment process. The cost of failure is too high. Each stakeholder in the 9-1-1 ecosystem must work together and ensure a smooth transition to NG9-1-1.

A migration proposal is being developed for each locality (or groups of localities if served by a consolidated public safety answering point or PSAP) to provide information about the AT&T solution, prerequisite work needed within the PSAP and the expected costs and funding provided by the Board. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the AT&T solution and determine whether it will meet the local needs. No locality should feel obligated to accept this proposal as they may use an appropriate procurement process for these services. This is simply to provide more information about services that are already available through an existing contract.

The Commonwealth's goal is to have all PSAPs fully deployed with the National Emergency Number Association (NENA) i3 standard. This standard states that all 9-1-1 calls are delivered to the PSAP on IP circuits with associated caller location data. If the equipment or GIS data in the PSAP is not capable of supporting the NENA i3 standard, interim solutions are available. These solutions allow calls to be delivered to the PSAP as IP, but then be converted back to analog for interface with the PSAP's systems. This interim solution established the PSAP's connection to the ESInet and will serve as the initial migration to NG9-1-1. After system and/or GIS data upgrades are complete the PSAP will be able to reach a full i3, NG9-1-1 environment. While AT&T will conduct a more exhaustive assessment after the PSAP executes a participation agreement, the review ISP performed for this proposal indicates that the **Amelia County PSAP** will need to have i3-capable call handling equipment in place that has been approved on the AT&T ESInet™ to be able to implement the full NENA i3 standard without the need for any interim or transitional steps. Some work on their GIS data will be required, but it should not impact the deployment schedule.

Solution Overview

AT&T is offering their Next Generation ESInet solution throughout Virginia as a solution that will facilitate a transition from legacy 9-1-1 networks to networks capable of supporting the growing demands of a mobile society. AT&T's solution supports key NENA i3 capabilities today, while forming the basis of a true NG9-1-1 platform that will support multimedia emergency services as standards are solidified in the industry.

The AT&T ESInet™ solution is a combination of a world class IP network and the NG9-1-1 components. Their ESInet solution (delivered as a service) comes complete with a full suite of advanced features, management services and tools to help ensure they provide the best possible service to each PSAP and ultimately the citizens they serve.

The AT&T ESInet™ solution provides the public safety community with an i3 architecture built from the ground up. AT&T's commitment to the NENA i3 standard is based on years of contributions to NENA standards committees and understanding the evolving needs and requirements of the Public Safety community. The AT&T solution is not just "i3 like," or "i3 aligned." As elements of the i3 standard continue to be ratified, updated and enhanced—AT&T will continue its commitment to i3. The AT&T ESInet™ services will provide Virginia everything needed to deliver the critical foundational components of an industry standard i3 solution delivered over the worlds most advanced IP network.

AT&T ESInet™ Included Features

- Initial build-out with expandable capacity
- Nationally distributed, geographically diverse and redundant service architecture
- Pre-deployed ESInet Call Processing Centers in AT&T datacenters across US
- Aggregation Centers (AGC) in AT&T Central Offices across the US to easily augment growth capacity
- Initial call processing capacity more than twice current US E9-1-1 call volumes
- NENA i3 compliant
- High availability design (99.999% availability)
- 6 core redundant architecture
- Redundant ALI database
- Interoperable with neighboring PSAPs
- Defense in depth security
- Text to 911 – National TCC Provider
- IPV6 capable
- Reporting Suite
- Full lifecycle management
- End to end management and monitoring
- Fully resourced team to install and support
- Full Business Continuity/Disaster Recovery organization
- Dedicated Program / Service Manager

The proposed solution provides a secure IP-based network with no single point of failure. With no single point of failure, the solution includes six ESInet data centers located at AT&T facilities throughout the country. The ESInet will provide the core for a robust emergency services IP network that assures call delivery. The AT&T solution enables call delivery into a legacy PSAP environment, an IP-enabled 9-1-1 PSAP, or to peer ESInets. AT&T and West Corporation have deep security and support provisions in

place. AT&T has demonstrated experience in cybersecurity. All of this is backed by AT&T's 24/7/365 Resolution Center, AT&T Labs, AT&T's world class project management and service delivery organizations.

Additional information about the AT&T solutions and the contract with Fairfax County can be found at: https://www.fairfaxcounty.gov/cregister/ContractDetails.aspx?contractNumber=4400007825

PSAP Call Handling Systems and Applications

Each PSAP system and application that interfaces with the 9-1-1 call must be assessed to determine if it will be compatible with NG9-1-1. This section of the migration proposal identifies each major system, assesses its readiness and outlines any upgrades that must or could be implemented with NG9-1-1.

Call Handling Equipment

Obviously, the PSAP's call handling equipment (CHE) is the primary system that interfaces with the 9-1-1 network. As such, it is likely the one that will require the deepest assessment and potential upgrades to operate with the NG9-1-1 network. CHE that is non-vendor supported (NVS) (or will become NVS during the transition period) or cannot be upgraded to be NG9-1-1 capable will be identified for replacement, but will be subject to the funding limits currently in place for the PSAP grant program ($150,000 individual or $200,000 shared services). This may also apply to technology refreshes of hardware due to becoming NVS or operating systems becoming end-of-support. The current CHE in the PSAP has been identified as:

- CHE manufacturer: **Motorola**
- CHE model: **Vesta**
- CHE version number (clients): **6.1 Build 1225**
- CHE version number (server): **6.1 Build 1225**
- CHE maintenance provider (channel): **Carousel Industries**
- CHE Geodiversity: **No**
- Number of positions: **4 (3 on main floor, 1 in backroom)**
- SIP capable: **Yes**

This CHE has been determined to be SIP capable, but will require an upgrade to Vesta 7.2 to implement the full i3 interface. This upgrade will require the purchase of two firewalls to connect to the ESInet. However, if the PSAP deploys text to 9-1-1 with the direct IP solution prior to NG9-1-1 migration, these firewalls will already have been purchased and can be used for both purposes.

The PSAP indicates the planned replacement of their CHE in February 2020. This is after the planned NG9-1-1 migration. Any new CHE will need to be tested and i3 functional on the AT&T ESInet.

Text to 9-1-1

Text to 9-1-1 can be deployed web-based on a separate computer or integrated with the CHE. While the former is typically at no cost, the latter tends to have a cost associated with it. Though text to 9-1-1 will be a base feature of NG9-1-1, the passage of Senate Bill 418 in the 2018 General Assembly requires all PSAPs to implement text to 9-1-1 by July 1, 2020. The PSAP has not yet deployed text to 9-1-1. Since their deployment for NG9-1-1 is scheduled before the new deadline for text to 9-1-1 deployment, they will deploy it with NG9-1-1 as a direct IP service integrated with their CHE. The cost to implement this will be covered by the Board.

Computer-Aided Dispatch

A computer-aided dispatch (CAD) system usually receives 9-1-1 location information (ALI) through an interface with the CHE. As a result, the change to NG9-1-1 should not have an impact on a CAD system. However, an assessment is made to determine if that is the case and if any options are available from the CAD vendor that could improve operations after NG9-1-1 is deployed. Any required upgrades would be funded through the Board, but any options to improve operations would be at the PSAP's expense. Additionally, as a reminder, CAD system replacement is no longer funded through the PSAP grant program so PSAPs need to plan for its replacement locally. The current CAD system has been identified as follows:

- CAD vendor: **ID Networks**
- CAD software version: **ID Dispatch 3.4.193.0**
- CAD interfaces: **Yes**
- Method of data transfer: **Serial**

This CAD system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Mapping Display System

Similar to a CAD system, a mapping display system usually receives 9-1-1 location information (ALI) through an interface with the CHE or is part of the CHE or CAD. As a result, the change to NG9-1-1 should not have an impact on a mapping display system. However, an assessment is made to determine if that is the case and if any options are available from the mapping vendor that could improve operations after NG9-1-1 is deployed. The current mapping display system has been identified as follows:

- Dispatch Mapping Vendor: **ID Networks (integrated with CAD)**
- Dispatch Mapping Software Version: **3.4.193.0**
- Method of data transfer: **Serial**

This mapping display system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Voice Logging and Recording

Typically, the audio recorded by a voice logging recorder is generated by the CHE. Though not a best practice, it is possible to record audio directly from the incoming 9-1-1 trunks so an assessment must be performed to ensure that audio from 9-1-1 calls will still be recorded after the deployment of NG9-1-1. The current logging system has been identified as follows:

- Logging Recorder Vendor: **Voice Print International**
- Logging Recorder Model: **Empower**
- Logging Recorder Software Version: **5.5**
- Audio Origination Point: **Both trunk-based and position-based**

It is important to note that with an IP connection, audio is not present on the circuit until the CHE responds with an answer code. This is usually not until it is answered by a call taker, though it could be earlier if an audio message is played for the caller (which technically requires the CHE to answer the call to play the message). This voice logging recorder system has been determined to not require any upgrade or modification with the deployment of NG9-1-1.

Data Analytics

Though the ECaTS data analytics application is provided to all PSAPs by the 9-1-1 Services Board, some PSAPs still use a second application, native to the CHE, for data analytics in the PSAP. While the Board will directly fund the upgrade to ECaTS to handle NG9-1-1, the local data analytics application may also need to be upgraded. The current data analytics application has been identified as follows:

- Primary Data Analytics System: **ECaTS**
- Data Analytics Vendor: **ECaTS**

Outcall Notification Systems

The PSAP currently uses **Code Red** as their outcall notification system. AT&T will provide quarterly subscriber data for use in this system at no cost. It is important to note that this data's use is limited to the outcall notification system and cannot be used for other purposes.

Other Systems or Applications

No other systems, that interface with the 9-1-1 call flow have been identified that will impact the PSAP's readiness for NG9-1-1.

Rack Space

The AT&T solution requires four units (4U) of rack space in the PSAP equipment/computer room for networking equipment. The rack must also have available electrical connections and be properly grounded. The PSAP is uncertain if rack space is available so funding is included in the budget to add one.

Coordination with Open Grants

The PSAP currently has one open grant:

1. **FY18 – NG9-1-1 GIS Data Preparation - $62,744**

To ensure the grant funds support the migration to NG9-1-1, the PSAP should, to the extent practical, use funding from the FY18 GIS grant to correct geospatial issues identified in the following section.

GIS Data Preparation

GIS Data Sources

Currently, a combination of the PSAP, the County Planning Department, and Timmons Group maintain all of the GIS data used in the PSAP. The **Amelia County PSAP** will be the source for all GIS data required for NG9-1-1 geospatial routing; however, other departments within the locality may contribute data or manage various processes. It is the responsibility of the PSAP to aggregate the GIS data required for the PSAP and NG9-1-1.

Locality GIS Data Readiness

Geospatial data drives the routing of NG9-1-1 calls. It is imperative that road centerline and address point data layers are highly accurate and well maintained. In 2016, VITA conducted an analysis of these data against the existing automatic location identification (ALI) database and master street address guide (MSAG) to help determine readiness and provided a report to each PSAP of the results. This analysis has been repeated making adjustment to the logic to ensure it matches the methodology used by AT&T in their analysis. The goal is to have 98% of all addresses in the current ALI database geocode against the locality's road centerline data layer. Once the 98% threshold recommended by NENA is met, the PSAP is ready to deploy NG9-1-1. Since matching to the address point is more accurate, VITA is

recommending the additional goal of matching 98% of ALI database addresses when geocoded against the address point data layer. If either of these goals in not achieved, then GIS data work must be completed to meet or exceed these goals. While financial support from the PSAP grant program may be available to fund this work, localities with GIS programs will be encouraged to make the necessary corrections in house if resources and time before deployment permits.

These are preliminary results based on expected data criteria of AT&T, and will be retested directly by AT&T after the execution of the participation agreement. This analysis provides the PSAP and their GIS support with an estimate of the extent of potential errors and helps identify the issues that need to be resolved. ISP staff including a GIS analyst and/or regional coordinator will begin working with the GIS data maintenance provider (internal or external) to identify and correct the GIS data or ALI data and achieve a higher match rate and thus more accurate geospatial routing.

Though there are other types of errors that may exist in the GIS data used by the PSAP (such as parity or cartography errors), these do not usually impact the routing of a 9-1-1 call. As a result, as part of this effort, only corrections that impact routing the 9-1-1 call will be required. PSAPs, in coordination with their GIS support, are encouraged to look more broadly at their data and work to improve its overall quality as well.

The 2018 MSAG/ALI/GIS analysis for the PSAP determined the current match rate to be as follows:

- Road Centerline (RCL) – **69.9%**
- Address Point – **72.3%**

One of the significant issues impact these results was 1,499 ALI records that were identified as Amelia County that were actually on Fort Pickett in Nottoway County. Removing these records from the calculation increased the match rate for RCL to **87.**0 and address point to **90.2%.** Additionally, there is an issue with the RCL data having differences in street names with the ALI. Correcting the street names so they match would increase the match rate for RCL to **92.6%**. The analysis also determined that no more than ten addresses were responsible for many of the address point discrepancies. Resolving no more than ten addresses will increase the result to **91.1%**. During July 2018, VITA will send each PSAP and/or GIS manager a report detailing this analysis, and identifying the specific ALI records that could not be matched to the RCL or address point data. To resolve these ALI address discrepancies, there are potentially four actions that will need to take place:

1. **Add a record to the GIS** – When the ALI database has correct addresses that have not been added to the GIS data, the addition of data needs to occur. This may entail adding a road segment to the RCL or a point to the address points.
2. **Change attribution in the GIS** – When an ALI record has a correct address but the RCL or address point attribution is incorrect the discrepancy in the GIS data must be resolved. A common issue is a difference with the street name or street type between the ALI and the GIS data. Often, this issue can be corrected using a batch script process. VITA staff can assist.
3. **Change attribution in the ALI database** – When the RCL or address point has the correct address but the ALI record is incorrect, the discrepancy in the ALI database may need to be resolved. Again, this is often caused by differences in the street name or street type between the records. If necessary, AT&T can make batch changes as they load the ALI database into the ESInet.
4. **Determine that the discrepancy is not an error** – There are often ALI records associated with telephone numbers that can never actually dial 9-1-1. They could be pilot numbers for a multi-line telephone system, foreign exchanges or shell records for wireless calls. While

many of those records were filtered out of the analysis, some may still be within the data. These ALI records need to be identified and removed from the match rate calculation. VITA staff will assist with this process.

In addition to the requirement for ALI address matches, there are five GIS data reviews that AT&T conducts on the GIS data to ensure there are no errors that would cause issues or uncertainty when routing a 9-1-1 call. As an example, duplicate GIS data could cause a search for an address to result in two or more matches. Since certainty of a location is important, checks are performed to ensure no duplicate data exist. The following is a list of the additional analyses performed and the number of records that were found to be in error that will need to be corrected:

- Road centerline has duplicate address ranges - **6**
- Road centerline has right or left side overlapping address range - **21**
- Road centerline has street name attributes not meeting Virginia, USPS, & NENA standard - 1**0**
- Address point Is duplicate, has no street name, or no address number - **107**
- Address point street name and road centerline street name mismatch - **496**

All of these errors will be also included in the analysis delivered to the PSAP and GIS Manager in July 2018. This includes geospatial data identifying each specific error that can be viewed in ArcMap. Utilizing this information will assist in error identification and correction.

Regardless of how they are resolved, **Amelia County** will need to resolve these issues through their GIS contractor, at least 3 months prior to the targeted deployment date.

PSAP Boundary

This is a GIS polygon data layer that defines the area of responsibility for each PSAP. The PSAP boundary must be agreed to by all adjoining PSAPs, thus its development must be a regional effort. VITA ISP will support the regional development and maintenance of a statewide PSAP boundary. This PSAP boundary layer is essential to routing 9-1-1 calls based on caller location by either civic address or coordinate location. This layer must not have gaps or overlaps to ensure correct call routing. VITA will develop a best practice to guide each PSAP through this process, which can also be facilitated by the VITA ISP regional coordinator.

Authoritative GIS Data Source Boundary

This polygon layer defines the area of authoritative GIS data sources, with no unintentional gaps or overlaps. The boundary must be agreed to by all adjoining data provisioning providers. Edge-matching conformance is ensuring that one and only one entity is responsible for maintaining each piece of GIS data within a PSAP. Within a PSAP boundary, there may be multiple sources for authoritative GIS data as a combination of cities and counties. The GIS sources within the PSAP need a common and agreed-upon understanding for the maintenance of each feature and the provisioning boundary of responsibility. Making sure there is agreement of that point and ensuring each locality is only providing data where they are the authoritative GIS data source are the purpose of this assessment. External edge-matching conformance addresses boundaries between neighboring PSAPs to ensure that there are no overlaps or gaps in the maintenance of GIS data. Geometric features need to meet at the agreed upon boundary.

MSAG transition/confirmation

In order to accommodate originating service providers (OSP) that are not fully i3 capable, AT&T will maintain a master street address guide (MSAG) as part of the NG9-1-1 solution. While the existing MSAG can be used and maintained, generating a new MSAG from local GIS data is a better solution since existing GIS data is generally of superior quality than the MSAG. To use GIS data to generate the MSAG,

an emergency service number (ESN) data layer must exist or be created. The PSAP has 47 ESNs for their area of responsibility. The PSAP maintains an ESN boundary layer depicting this area so Amelia County will utilize a GIS generated MSAG with the migration to NG9-1-1.

Ultimately, ESN and community name need to be attribute fields in the address points and road centerlines layers to support call routing until the OSP can transition to i3. If these attributes are not part of a locality's existing maintenance workflow or GIS database, they can be created by building a separate polygon layer and transferring these values to the centerline segments (commonly referred to as a spatial join). The spatial join method can be implemented as part of the workflow for preparing to transfer GIS data to AT&T to ensure these fields are accurately populated.

GIS Ingest Readiness

Localities may choose to implement AT&T's tools and workflows for ongoing maintenance of GIS data, or may choose to continue using internal workflows or third-party support services. As GIS data is updated, regardless of the tool set or service provider, the GIS datasets must be provided to the spatial interface (SI). The SI provisions the updated GIS data to drive location validation and call routing functions in the ESInet.

Localities choosing to adopt or transition to the AT&T toolset will have a defined workflow for providing updated GIS data. Localities wishing to use existing tools, acquire third-party tools, or rely on a service provider will need to ensure the workflows are in place to accept and resolve discrepancy calls (formalized requests to update GIS datasets), and periodically transfer updated GIS datasets to the AT&T spatial interface. This section will establish the path and milestones for completing this work.

Data maintenance Workflow/Procedures

The quality of GIS data diminishes over time unless it is properly maintained. It is important that localities document GIS data maintenance workflows and validations to ensure synchronization across GIS layers. This can include periodically ensuring conformance of edge matching of GIS data at shared boundaries. VITA has confirmed that the GIS organizations supporting the PSAP have appropriate internal data maintenance procedures/discrepancy management workflows.

Call Routing

The ultimate goal for all PSAPs is to use geospatial (i3) routing for all 9-1-1 calls. This solution uses all the NENA i3 standards for delivering voice and data directly into the PSAP's CHE. 9-1-1 call routing is based on the PSAP-provided GIS data. The ESInet router hands off the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be able to receive the voice call via SIP. Location data delivered via SIP using PIDF-LO, and would perform all the i3 protocols such as LoST and HELD.

If the PSAP's CHE is not NG9-1-1 capable or the geospatial data is not ready for deployment, a PSAP can still connect to the ESInet with an interim solution for call delivery. This will allow the PSAP to migrate on schedule, and they can implement geospatial (i3) routing when the GIS data is suitable for this use and the CHE is i3 capable.

The two interim solutions are as follows:

> **Legacy PSAP Gateway** - This solution allows the PSAP to be connected to the ESInet through a network gateway. In this call delivery configuration, the call is routed with the legacy MSAG and ALI data, however this is done over the IP network. Once the call reaches the gateway, the voice data is converted to analog and processed over an analog voice circuit to the PSAP's CHE. This does not require any upgrade to the CHE and as mentioned uses a legacy ALI lookup. The ALI

lookup would use a standard serial connection (in this case to the legacy PSAP gateway placed in the PSAP) to retrieve location information.

Transitional SIP - This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE. The ESInet router passes the call to the PSAP networking equipment (router or firewall). The PSAP's CHE must be capable of receiving the voice call via SIP. The CHE would still use a legacy ALI lookup. The ALI lookup would use the standard serial connection (in this case to the ESInet routers) to retrieve location information. MSAG and ALI are still used to conduct the routing.

Again, the ultimate goal for all PSAPs is to geospatially route all 9-1-1 calls. If the geospatial data meets the accuracy goals, a PSAP should be able to deploy NG9-1-1 with geospatial routing. If for some reason, this cannot be accomplished, interim solutions are available to allow the PSAP to deploy on schedule, and they can convert to geospatial routing later.

Based on an assessment of the CHE and GIS data, geospatial routing can be implemented initially with NG9-1-1 and no interim solution will be necessary. While some GIS data correction must take place, the PSAP is committed to correcting those issues well in advance of the required milestone and to maintain that data through the transition period.

Call Transfers

During the transition to NG9-1-1, the AT&T ESInet will be interconnected with all selective routers from Verizon and CenturyLink to ensure that calls received by PSAPs that have deployed NG9-1-1 can be transferred to PSAPs on the legacy E9-1-1 network and vice versa. No ability to transfer calls will be lost during the transition when neighboring PSAPs may be on different networks.

Post deployment, all Virginia PSAPs should be on an ESInet and should be able to transfer calls among PSAPs with accompanying location data. Even if more than one ESInet is deployed from different solution providers, the goal is that they are interconnected and calls can be transferred between them.

Network

The NG9-1-1 solution offered by AT&T is a service; therefore, the network is provided as part of that service. However, there are several issues impacting the network that may be outside of this service that must be considered. The configuration of the PSAP's connection to the network will be based on the legacy E9-1-1 network information as follows:

- Legacy E9-1-1 service provider: **Verizon**
- ALI database provider: **Verizon**
- Selective router pair(s): **Chester/Richmond Stuart**
- Trunk counts (all): **17**
    - Wireline: **4**
    - Wireless: **4**
    - SIP: **0**
    - Administrative: **9**

The NG9-1-1 network will be designed to support the same number of concurrent 9-1-1 calls as can be supported on the legacy network (wireline and wireless trunks). The PSAP can designate what happens to calls that exceed this number. This setting is determined in the PSAP CHE, but the options will be discussed with AT&T during system configuration. The options include providing the caller with a fast

busy signal, routing the call to another PSAP, or overflowing the call to another line. As a best practice, VITA ISP recommends routing the call to a fast busy signal or rerouting calls to another PSAP.

Redundancy and Diversity

In order to provide 99.999% availability of the NG9-1-1 service, each PSAP must have diverse and redundant IP connections to the ESInet. Having redundant connectivity means having two connections, but they could be co-located or follow the same path. Having diversity means that those redundant connections follow different paths that never touch from origin to destination. To achieve the 99.999% availability, diverse connectivity is planned for all PSAPs. There is a chance the diversity is simply not available to all PSAPs. AT&T has conducted a diversity study for each PSAP. Unfortunately, the results for the **Amelia County PSAP** are that diversity is not currently available. Redundant connectivity will instead be provided. If a diversity option becomes available in the future, the funding for such a solution could be provided by the Board as part of the PSAP's funding submission.

Disaster Recovery

Though the NG9-1-1 solution is designed to provide 99.999% availability, disaster recovery plans still need to be in place for instances when the network becomes unavailable or the PSAP is otherwise inoperable (evacuation, structural damage, etc.). Broadly, when the PSAP must be abandoned, there are two approaches to disaster recovery, a) having a backup PSAP within the locality or b) partnering with a neighboring PSAP to take the calls. Additionally, if only the network is impacted and the PSAP is still operable, 9-1-1 calls can be forwarded to a 10-digit telephone number in the same PSAP. Location data is lost, but that call can still be answered and processed.

Currently, the PSAP has a disaster recovery plan, which states that if the PSAP must be evacuated for any reason, or if the 9-1-1 network is unavailable and the PSAP can still be occupied, calls are routed to the **Dinwiddie County PSAP**.

Based on the current disaster recovery plan, no additional steps must be taken in order for this plan to continue to be viable with NG9-1-1. The PSAP need only inform AT&T of their disaster recovery plan during the detailed planning after the participation agreement is signed. AT&T will then build those routes in the configuration files both for during the transition and post-migration to NG9-1-1.

While support will be available to maintain the current disaster recovery capability for the PSAP, it is important to note that there are aspects of disaster recovery that are beyond the scope of this migration proposal. As an example, while the NG9-1-1 network can be configured to route calls to a neighboring PSAP in the event of a PSAP evacuation, getting the 9-1-1 call to another PSAP to be answered is only part of the dispatching process. The call for service then needs to be sent to first responders through a radio channel or mobile data. Assuming that capability already exists, nothing about the deployment of NG9-1-1 should impact that. In cases were disaster recovery does not exist currently, this migration proposal only deals with getting the 9-1-1 call routed to another PSAP (backup or neighboring) and does not address radio or CAD interoperability needed to effect the dispatch of first responders. VITA ISP can assist with that process, but outside of NG9-1-1 deployment. Additionally, VITA ISP can assist with the exercising of disaster recovery plans, which should be done at least once a year to make sure they are fully functional when needed.

Secondary PSAP

There are no secondary PSAP(s) identified within the service area of the primary PSAP.

Network Security

AT&T employs a defense-in-depth security strategy to protect sensitive information. Security mechanisms are deployed throughout the service in addition to the multi-layered security provided by the network itself, in order to provide seamless and effective security. AT&T's world-class experience in both IP and Telephony Security provides the following key security elements.

- Availability of the VoIP Service: Stop denial or deterioration of service functionality
- Integrity of the VoIP environment: Prevent system functions or data from being corrupted
- Confidentiality and Data Privacy in VoIP: Keep information secure and private

The AT&T IP/MPLS Converged Network deploys the same attention to state-of-the-art security measures as have been provided on traditional PSTN networks:

- AT&T Security Policy and Requirements (ASPR) and AT&T OneProcess provide the security foundation.
- AT&T Internet Protect helps protect against worm/virus attacks and offers DDoS (denial of service) protection.
- A 24x7 Security Network Operations Center (SNOC).
- AT&T MPLS Voice Aware Network provides security and QoS.
- AT&T Global Fraud Management System protects AT&T VoIP against fraud.
- AT&T hub-and-spoke MPLS VoIP VPN for customer access helps to provide security and QoS for AT&T.

In the AT&T MPLS network, customer services are provisioned on specific interfaces of an MPLS VPN by using known IP addresses. This approach enables AT&T to authenticate users and traffic. Rather than supporting signaling or voice encryption, AT&T relies on the MPLS security and secured IP tunnels to provide confidentiality for signaling and voice.

The data privacy and data integrity of an MPLS VPN is not dependent on encryption or address space-based access controls. AT&T protects the core network against compromise by:

- Hardening the routers and turning off unnecessary services.
- Implementing TACACS+ authentication, authorization and accounting for router access/commands.
- Automated provisioning of router configuration driven from ordering systems, to minimize human error, complimented by daily discord reports and investigation.
- 24/7 monitoring and DoS mitigation tools.
- Route dampening and/or limiting total number of routers learned to protect routing stability.
- Firewalls, IDS, token based authentication, encrypted remote access for network and service management systems/work centers.

The AT&T security culture assures that these architectural protections are enforced by audits, employee awareness training, penetration testing and enforcement of architectural principles and policy.

In addition, AT&T MPLS VPN service is a transport only service, with the data integrity and data privacy protection as described above. AT&T monitors the core network for traffic anomalies and shared resource consumption thresholds to protect the core network and assure that traffic storms do not impact the performance of other customers. AT&T network management and service management systems are hardened, require authentication and authorization control, and are instrumented with

intrusion detection to assure that they are not compromised, and cannot serve as a vector to attack the network or customers.

Schedule for Deployment

A clear and accurate schedule is essential to ensure cost effective and coordinated deployment throughout the Commonwealth. For that reason, this section identifies all milestones that must be met in order to successfully deploy. To manage costs, a six-month deployment window has been established for each selective router pair regardless of whether the PSAPs choose the AT&T or another NG9-1-1 solution. The following chart identifies the deployment periods for each selective router pair:

Selective Routers	9-1-1 Service Provider	Population	Time Period
Fairfax/Alexandria	Verizon	2,494,184	January 2019 – June 2019
High St Portsmouth/Jefferson	Verizon	1,662,247	July 2019 – December 2019
Stuart/Chester	**Verizon**	**1,660,182**	**January 2020 – June 2020**
Charlottesville/Farmville	CenturyLink	403,369	July 2020 – December 2020
Fredericksburg/Winchester	Verizon	343,031	July 2020 – December 2020
Danville/Lynchburg Church St	Verizon	320,247	July 2020 – December 2020
Staunton/Salem	Verizon	453,065	January 2021 – June 2021
Shenandoah County ECC	Shentel	43,175	January 2021 – June 2021
Covington	Ntelos	21,556	January 2021 – June 2021
New Castle	TDS Telecom	5,158	January 2021 – June 2021
Floyd County	Citizens	15,651	January 2021 – June 2021
Monterey-Highland Telephone	Highland Telephone	2,216	January 2021 – June 2021
Blacksburg/Norton	Verizon	340,101	July 2021 – December 2021
Johnson City/Wytheville	CenturyLink	338,311	July 2021 – December 2021

Amelia County PSAP's deployment window will be **January 2020 – June 2020**. A specific date will be determined after all PSAPs have made the NG9-1-1 decision and AT&T develops the master schedule. Regardless of the specific date, any CHE upgrades, diverse connectivity enhancements and GIS data corrections must be completed at least **three months** before the deployment date. If they are not completed by this date, migration can still occur on schedule, but it will require the deployment of an interim solution instead of full i3.

Cost Estimates for NG9-1-1 Funding

The 9-1-1 Services Board has committed to funding the transitional costs for NG9-1-1 deployment so it is important that all such costs are identified and made part of the overall budget. It is also important that the funding be provided on a fair basis across all PSAPs in Virginia. While most costs will be fully funded, others like replacement of non-vendor supported CHE will continue to be funded at the same levels as has been provided through the PSAP grant program in prior years. Based on all of the information provided in this migration proposal, the following budget is for your deployment of NG9-1-1:

Category	Amount	Notes
NG9-1-1 non-recurring cost	$4,000	Flat rate from AT&T
CHE Replacement	$150,000	Replacement planned in 2020
CHE Upgrade	$30,000	i3 deployment services

Text-to-911	$30,000	Currently does not have text
CAD upgrade	$0	Not required
Mapping upgrade	$0	Not required
Voice logging upgrade	$0	Not required
ECaTS Data analytics expansion	$1,000	i3 logging and text to 9-1-1
Other system upgrades	$0	Not required
Rack space	$2,000	Space may not be available
Diverse connectivity costs	$0	
Disaster recovery upgrade	$0	Not required
Secondary PSAPs	$0	None
GIS data preparation	$0	Currently working with grant funds
Legacy 9-1-1 transition costs	$1,833.30	Verizon cost
Project management assistance	$0	None requested
Total	$218,833.30	

The monthly recurring cost for the AT&T solution is **$4,035.64** which is set for the ten-year term of the Fairfax County contract. The current monthly recurring cost for the legacy E9-1-1 solution is approximately **$630.74**. The estimated monthly increase to the PSAP after deployment is approximately **$3,404.90**. This increase will be covered by the Board for a period of 24 months after deployment is complete. At the end of this period, the entire cost will be the responsibility of the PSAP. Copies of invoices from the current 9-1-1 service provider must be provided to substantiate the current monthly cost. This will be the basis for determining whether monthly funding is provided and in what amount.

The monthly recurring cost is impacted by the bandwidth into the PSAP. Bandwidth is primarily impacted by the number of concurrent calls each PSAP wants to be able to process. As the PSAP grows and adds bandwidth to handle more concurrent calls, the increased monthly cost will be the obligation of the PSAP even if during the 24 months following transition. Additionally, the recurring maintenance costs for PSAP equipment and GIS data will remain the responsibility of the PSAP.

Projected Board Funding

The Board will begin awarding funding for NG9-1-1 in late 2018. Until the Board approves the funding request from the PSAP, all funding levels shown are just projected. Based on the funding guidelines approved by the Board (or will be approved by the Board), the following funding would be awarded to the PSAP:
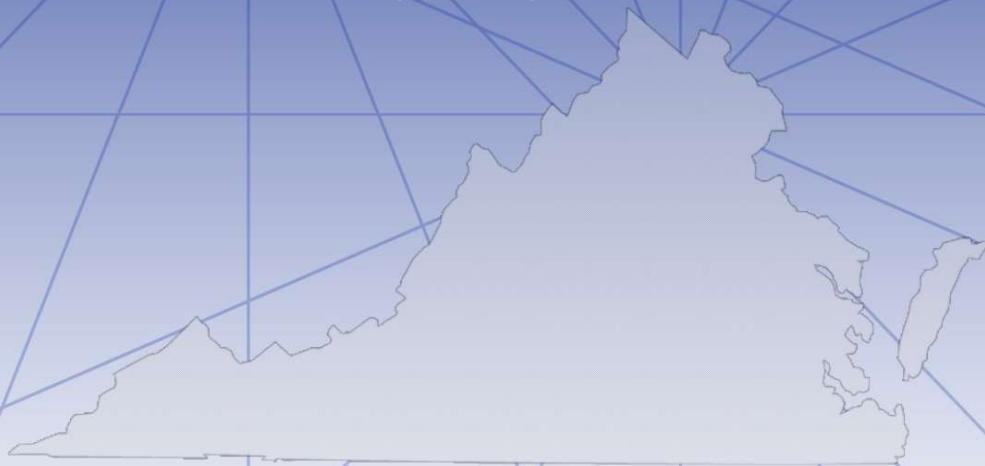
Type of Funding	Amount
Non-recurring	$218,833.30
Recurring (over 24 months)	$81,717.60
Data Analytics (monthly)	$415.12

The funding amount shown is based on estimates at this point. As binding quotes are received, the budget will be adjusted. The approval from the Board will be for the specific equipment or services and contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. That additional funding cannot be shifted to another part of the project.

Commonwealth of Virginia Next Generation 9-1-1

Proposal Acceptance Letter (PAL)

www.vita.virginia.gov

Purpose

The Proposal Acceptance Letter (PAL) functions as the funding request for the NG9-1-1 Migration Program. Primary PSAPs and secondary PSAPs currently served by a selective router pair are eligible to submit a PAL and request funding from the 9-1-1 Services Board (the "Board"). The PAL confirms a PSAP's acceptance of the information contained in their NG9-1-1 Migration Proposal (MP) and signals their intent to deploy NG9-1-1. The PAL should be submitted to the electronic mailbox for the PSAP Grant Program - psapgrants@vita.virginia.gov.

The funding cycle for the NG9-1-1 Migration Program starts on July 1, 2018 and remains open throughout the NG9-1-1 deployment period. The 9-1-1 Services Board will review funding requests received no later than 45 calendar days in advance of each regularly scheduled meeting. A Grant ID and email receipt notification will be sent to the e-mail address listed on the PAL.

The funding amount requested in the PAL should not exceed the recurring and non-recurring cost estimates contained in the MP. After reviewing a PSAP's MP and PAL, the Board will approve funding for specific equipment and services. Contingency funding will be available should the final cost be slightly higher so long as the original scope of the effort does not change. Similarly, if the final cost is lower, the budget will be adjusted lower. This additional funding cannot be shifted to another part of the project. Also, if a PSAP's MP needs to be revised for a material change after it has been approved by the Board, an additional PAL would need to be submitted to obtain any additional funding.

When the Board approves a PSAP's funding request, the PSAP will be expected to execute a contract vehicle with a NG9-1-1 solutions provider within three months of the award date. If a PSAP needs additional time to execute this contract, the PSAP will need to request an extension from the Board. The PSAP will also be expected to complete all identified NG9-1-1 ready implementation steps within three months of the scheduled deployment date. Funding for approved equipment and services may not be immediately available to a PSAP. ISP staff will provide a spending plan, specific to a PSAP's deployment schedule, that details in which year of the deployment period funding will for available to the PSAP.

Local Project Manager (Contact)

PSAP/HOST PSAP NAME: Amelia County Sheriff's Office

CONTACT TITLE: Admin

CONTACT FIRST NAME: Ranna

CONTACT LAST NAME: Cope

ADDRESS 1: 16441 Court Street

ADDRESS 2: P O Box 463

CITY: Amelia

ZIP CODE: 23002

CONTACT EMAIL: rdcope@ameliasheriff.org

CONTACT PHONE NUMBER: 8045612118

CONTACT MOBILE NUMBER: Click here to enter text

CONTACT FAX NUMBER: 8045612759

Financial Information

Amount Requested: $ 300550.90

Date of Completed Migration Proposal: November 1, 2018

PSAP preference for Board payment on behalf of PSAP for incurred eligible NG9-1-1 expenses:

☒ Yes   ☐ No

Virginia 9-1-1 Services Board
PSAP Grant Program

FY21
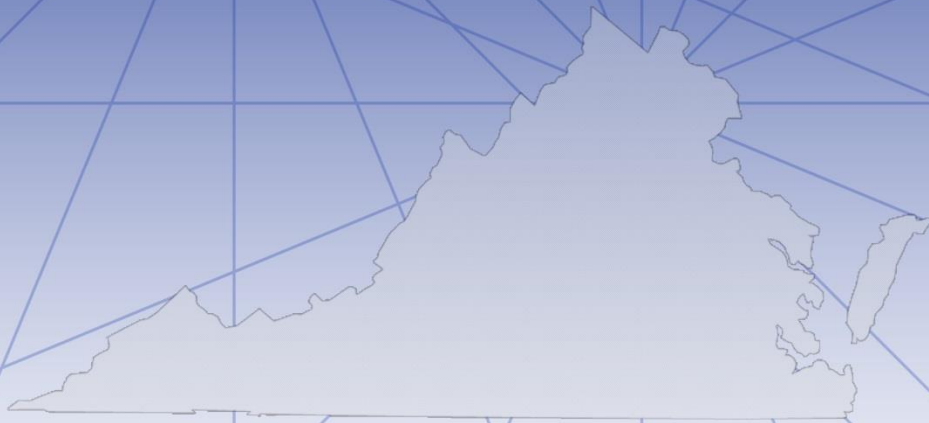
May 20, 2019

www.vita.virginia.gov

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INTRODUCTION

Executive Summary

The commonwealth is implementing Next Generation 9-1-1 (NG9-1-1) because the current analog network that provides 9-1-1 call delivery to Virginia Public Safety Answering Points (PSAPs) is going away. Over the next few years, 9-1-1 service providers will be decommissioning the selective router pairs that comprise the foundation of this legacy analog network. To address this issue, the 9-1-1 Services Board (the "Board") conducted an NG9-1-1 Feasibility Study in 2015 and made the decision to transition to a statewide IP-based infrastructure, known as an Emergency Services IP Network (ESInet). With planning efforts completed, the Board is now focused on implementing NG9-1-1 throughout the commonwealth. Though the Board is recommending the Fairfax contract with AT&T for NG9-1-1 services, each locality will need to determine the most appropriate path and may use other NG9-1-1 service provider contracts. If a locality chooses a solution other than AT&T, the locality is responsible for interoperability with the AT&T solution (see Appendix A).

The primary focus of the current PSAP Grant Program Guidelines is to lay out the process for determining and allocating funding for allowable NG9-1-1 migration costs during the multi-year NG9-1-1 deployment period, provide funding for Text-to-9-1-1, and to continue to provide funding for 9-1-1 and GIS education and training in FY 21. As a result, these guidelines contain three programmatic areas:

- NG9-1-1 Migration Program
- PSAP Education Program (PEP)
- Text-to-9-1-1 Program

The NG9-1-1 Migration Program provides funding for NG9-1-1 migration expenses for eligible program participants throughout the Board established deployment period. Participants eligible to receive funding are primary PSAPs and secondary PSAPs currently served by a selective router pair. The amount of funding these PSAPs can receive is based on the analysis contained in the NG9-1-1 Migration Proposal. The purpose of the MP is to provide information about prerequisite work needed within the PSAP, expected costs, and funding provided by the Board for a NG9-1-1 solution. Eligible PSAPs have already received an MP based on the AT&T solution. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate each NG9-1-1solution and determine whether it will meet local needs.

Funding will only be provided to address items specifically identified in the proposal document. As a result, many items eligible for funding in previous grant guidelines will no longer be funded. PSAPs will demonstrate their acceptance of the information included in the MP by completing a Proposal Acceptance Letter (PAL). The MP and PAL will be considered a FY 21 NG9-1-1 Migration Program funding application.

The PEP provides funding to primary PSAPs for the purpose of obtaining 9-1-1 and GIS education and training. PSAPs have two funding options:

- $3,000 per primary PSAP for individual PEP requests
- $4,000 per primary PSAP for multi-jurisdictional PEP requests

The Text-to-9-1-1 Program provides funding to primary PSAPs to enable PSAPs to implement SMS Text-to-9-1-1 prior to NG9-1-1 deployment to meet the required implementation date of July 1, 2020.

This document contains information about the rules and requirements governing the PSAP Grant Program, the types of projects eligible for funding, and instructions for completing and submitting the grant application. Information for funding and grant programs contained in these guidelines supersedes programmatic information contained in guidelines from previous years. The final authority to administer this grant program rests with the Board. The Board can amend, alter, or change these guidelines, as well as require the Grant Committee to undertake additional responsibilities not already specified in the guidelines. Requests from PSAPs for exceptions to the guidelines are discouraged.

What is the PSAP Grant Program?

The PSAP Grant Program will financially assist primary PSAPs and secondary PSAPs currently served by a selective router pair with NG9-1-1 migration costs identified in each PSAP's MP. The program also provides funding to primary PSAPs for 9-1-1 and GIS education and training and to implement SMS Text-to-9-1-1 prior to NG9-1-1 deployment. Funding is made available through the Code of Virginia and administered by the Board. Funding is limited to those projects that fall within the programmatic areas identified in the guidelines. As a result, requests from PSAPs for exceptions to the guidelines are discouraged.

The PSAP Grant Program has been established in the Code of Virginia, §56-484.17(D):

Wireless E-911 Fund; uses of Fund; enforcement; audit required:

… 40 percent of the Fund shall be distributed to PSAPs or on behalf of PSAPs based on grant requests received by the Board each fiscal year. The Board shall establish criteria for receiving and making grants from the Fund, including procedures for determining the amount of a grant and payment schedule; however, priority shall be given to grants that support the deployment and sustainment of NG9-1-1.

PSAP Grant Committee (PGC)

The Board chair makes appointments to the PSAP Grant Program's Grant Committee. Membership to the PGC will be staggered and appointments are made for three-year terms. Members can be reappointed for only one additional consecutive term. Committee members are appointed and serve at the discretion of the Board's chairperson. At all times, the Grant Committee membership shall consist of at least two Board members.

Furthermore, members of the Grant Committee should adequately represent the geographic diversity of the commonwealth, the varied operational capacities of Virginia primary PSAPs, and public safety professional organizations. Accordingly, a nine-person Grant Committee is established consisting of the following individuals:

- Two Board members (one of which will chair the committee)
- Four primary PSAP representatives (two of which will represent APCO and NENA)
- Three at-large members

Members with the same organizational affiliation will have different reappointment and replacement schedules:

- Replacement/Reappointment Schedule 1:

  o one Board member (co-chair)
  o two primary PSAP representatives (one of which will represent APCO)
  o and two at-large members

- Replacement/Reappointment Schedule 2:

  o one Board member (chair)
  o two primary PSAP representatives (one of which will represent NENA)
  o and one at-large member

Each year, in anticipation of the upcoming grant application cycle, the Grant Committee recommends grant guidelines and funding priorities. This edition

of the PSAP Grant Guidelines will function differently. This document provides guidelines for a multi-year funding program to assist PSAPs in the deployment of NG9-1-1 Text-to-9-1-1 and the FY 21 PEP. The Grant Committee will also make recommendations to the Board regarding the development of any criteria for awarding grants, and the proposal of any necessary changes to the administration of the PSAP Grant Program.

The Grant Committee will meet multiple times a year to evaluate all complete and eligible applications. Furthermore, the committee has the discretion to make case by case evaluations and recommendations for approval or disapproval of all submitted applications.

Auditing

The Board shall audit funding received by all recipients to ensure that it was utilized in accordance with the award requirements. If it is determined that the funding was misused, or if the guidelines were not adhered to, the commonwealth may take appropriate action to the extent permitted by law, including, and not limited to, requiring the return of the funds.

Errors

If ISP staff discovers that a funding or grant award is not consistent with Board action, ISP staff will notify the PSAP by email about the error and take corrective action.

Definitions

Call Handling Equipment (CHE) – Telecommunications equipment used to receive calls for service from the public in the PSAP. This equipment must be must be NG9-1-1 ready (see page 8). CHE that is non-vendor supported (NVS), will become NVS during the migration period, or cannot be upgraded to be NG9-1-1 ready will be identified for replacement. This may also apply to technology refreshes of NVS supported hardware or operating systems becoming end-of-support. Funding is available for CHE projects (see page 10). CHE projects may include networking for shared services approaches, hosted solutions with collaborative procurement, and text-to-9-1-1. Bundled CHE purchases may include headsets, time sync, and maintenance.

Computer Aided-Dispatch (CAD) – A computer-based system which aids PSAPs by automating selected dispatching and record keeping activities. Funding for CAD is limited to upgrades or modifications identified in localities' MPs as required for the deployment of NG9-1-1.

Interoperability – All NG9-1-1 ESInet solutions deployed in Virginia must be interoperable with the Fairfax County NG9-1-1 ESInet (see Appendix A).

Legacy Network Gateway (LNG) – The method to connect TDM-based primary PSAPs and secondary PSAPs currently served by a selective router pair to the ESInet.

Mapping System – A computer-based system to display location information in a geographic information system (GIS) or otherwise on a map within the PSAP. Funding for mapping systems is limited to upgrades or modifications identified in localities' MPs as required for the deployment of NG9-1-1.

Memorandum of Understanding (MOU) - A formal document that guides and directs the parties of a physical consolidation project in regards to their affiliation and working relationship, inclusive of anticipated future arrangements, for the purposes outlined in the grant application submitted by the parties.

Migration Proposal (MP) – A document that provides information about prerequisite work needed within the PSAP, expected costs, and funding provided by the Board for a NG9-1-1 solution. The goal of the MP is to provide each PSAP/locality with all of the information needed to evaluate the NG9-1-1 solution and determine whether it will meet local needs.

Multi-jurisdictional Agreement (MJA) – A document, signed by appropriate representatives of all PSAPs/localities planning to participate in a Shared Services Project or a multi-jurisdictional PSAP education or training project.

It defines their working relationship and commitment to the project. The MJA must be included with the grant application.

Multi-Jurisdictional Projects – A project in which two or more primary PSAPs participate. For the purpose of these grant guidelines, these are physical consolidations and multi-jurisdictional PEP projects.

NG9-1-1 Deployment Period – A period established by the Board during which time PSAPs may submit a NG9-1-1 Migration Program funding request.

NG9-1-1 GIS Projects – A project that relates directly to the preparation of PSAP boundary, road centerline, and address point data based on approved NG9-1-1 data standards, applicable data models, and GIS best practices. These projects must include a long-term data maintenance plan. Funding for any day-to-day work or continued geospatial maintenance is not allowed. NG9-1-1 GIS projects eligible for funding will be based on results of the most recent GIS/MSAG/ALI analyses and identified in the MP.

NG9-1-1 Ready – Call handling equipment with the ability to receive SIP (see definition on page 9) communications natively at the call handling interface. This does not include the text-to-9-1-1 integration component, which can be added at a later date.

Non-Allowable Items – Historically these items have been bricks and mortar, outside security, card key systems, furniture, personnel salaries, benefits, and local project management time. However, this is not an inclusive list and applicants should seek guidance from ISP staff if they are unsure. In addition, only items that are specifically identified in the MP document as necessary to deploy NG9-1-1 would be eligible for NG9-1-1 funding. As a result, many items eligible for funding in previous grant guidelines will no longer be funded.

Non-Vendor Supported (NVS) - Replacement of CHE during the deployment period, to include hardware and software, that is no longer supported by the vendor to enable primary PSAPs to maintain current service levels. Only NVS CHE and related services will be funded. Failure of a reseller or partner to support hardware/software and/or service does not meet this definition unless there are no other options for support available. Supporting documentation from the vendor must be included with the funding or amendment request as a requirement for funding.

Physical Consolidation – The physical consolidation of two or more primary PSAPs into a single physically combined primary PSAP with an integrated management structure established by MOUs that serves the same constituent population previously served by the independent primary PSAPs. In addition, all parties must benefit directly from the consolidation activities

implemented with a grant award. CHE as defined in the guidelines is an allowable project for a physical consolidation project.

Primary Public Safety Answering Point (PSAP) – A PSAP that receives the initial wireless E9-1-1 call as recognized by the Virginia 9-1-1 Services Board as eligible to receive wireless funding.

Proposal Acceptance Letter (PAL) – A document completed by a PSAP that confirms the acceptance of information contained in the MP, the PSAP's intent to deploy NG9-1-1 and execute a contract vehicle with a NG9-1-1 solutions provider within a specific period of time, and identifies a PSAP's preference for Board payment of eligible NG9-1-1 expenses to be incurred.

Public Safety Answering Point (PSAP) – A facility equipped and staffed on a 24-hour basis to receive and process E9-1-1 calls or that intends to receive and process E9-1-1 calls and has notified commercial mobile radio service (CMRS) providers in its jurisdiction of its intention to receive and process such calls.

Recurring 9-1-1 Costs – Periodic costs beyond the initial purchase of 9-1-1 equipment and/or services. With the purchase of 9-1-1 equipment and services, five years of prepaid service is allowable, but the period of cost recovery is limited to the grant award period.

Secondary PSAPs –A PSAP to which 9-1-1 calls are transferred from a primary PSAP. Secondary PSAPs currently served by a selective router pair are eligible to participate in the NG9-1-1 Migration Program, but are not eligible to participate in the PEP or receive funding for CHE or consolidations.

Session Initiation Protocol (SIP) - A protocol specified by the IETF (RFC3261) that defines a method for establishing multimedia sessions over the Internet. Used as the call signaling protocol in VoIP, NENA i2 and NENA i3.

Shared Services Project – Project in which the provisioning and use of 9-1-1 equipment and/or services occurs between two or more PSAPs in order to "share" the funding and resourcing of equipment and software used to process 9-1-1 calls. The purchase of hardware and software is included. Projects are not considered as shared services if they consist solely of a network solution that links together individual systems.

Subscription Based Learning Programs – Online 9-1-1 and GIS education/training events that are purchased on a monthly or yearly basis, and are an eligible expense for the PEP. See pages 20 -23 for additional information.

Supplanting – Grant funds are to be used to supplement, not replace, the portion of the local governments' budgets that pertain to PSAPs. Supplanting occurs when general funds are replaced.

Transitional SIP –This solution uses an IP (SIP) connection to get the voice call directly into the PSAP's CHE.

Wireless E-911 Fund – A dedicated fund consisting of all moneys collected pursuant to the Wireless E-911 surcharge, as well as any additional funds otherwise allocated or donated to the Wireless E-911 Fund.

NG9-1-1 MIGRATION PROGRAM

Eligibility

Any Virginia primary PSAP and secondary PSAP currently served by a selective router pair are eligible to apply for and receive funding from the NG9-1-1 Migration Program.

Funding Amounts

Any primary PSAP and secondary PSAP currently served by a selective router pair are eligible for full funding during the NG9-1-1 deployment period for items necessary for call routing transitioning to an ESInet. These items will be identified in each primary PSAP's and secondary PSAP's MP. There is no required local match.

If during the funding award period a primary PSAP will be involved in a consolidation project and/or has CHE that becomes NVS, the PSAP would be eligible for funding for these projects up to the following amounts:

- $200,000 per PSAP participating in a shared services CHE project
- $150,000 for an individual PSAP CHE project
- $500,000 per physical consolidation project

Technology refreshes of supported hardware or operating systems becoming end-of-support may also be considered NVS. Secondary PSAPs are not eligible for funding for CHE replacement or consolidation projects.

Shared services projects among PSAPs are strongly encouraged. All jurisdictions participating must be identified in a multi-jurisdictional agreement (MJA) signed by all parties. Shared services projects require that one eligible primary PSAP act as the "host" for the initiative. The "host" will be the fiscal agent responsible for fulfilling all requirements such as reports, control of and accounting for funds, and distribution and control of equipment purchased.

Similar to a shared services project, one of the primary PSAPs participating in a physical consolidation must act as the "host" and is responsible for fulfilling the same requirements. Additional funding may be available for consolidations if substantial NG9-1-1 migration cost savings can be demonstrated. Primary PSAPs interested in obtaining funding for a physical consolidation project must satisfy two prerequisites before receiving funding:

- First, the localities that govern the PSAPs involved in this physical consolidation must sign a MOU in support of a physical consolidation.

- Second, a feasibility study must be completed by the localities using local funds.

Funding Award Period

Funding awards are for three years from the date approved by the Board. Since NG9-1-1 deployments will be occurring by selective router regions over a multi-year period, portions of a PSAP's funding may not be immediately available and distributed over different fiscal years. All funds must be expended by the end of the award period unless an extension request is approved by the Board.

Funding Cycle and Application

The funding cycle for the NG9-1-1 Migration Program begins on July 1, 2018 and will remain open throughout the NG9-1-1 deployment period. A funding application consists of the final version of the MP prepared by ISP staff and a completed PAL.

How to Apply/Deadline

Funding applications will be reviewed and approved on an ongoing basis throughout the NG9-1-1 deployment period. Applications are due by 5 pm no later than 45 calendar days in advance of a scheduled Board meeting. Applications must be submitted electronically to the PSAP Grant Program mailbox (psapgrants@vita.virginia.gov) with required supporting documentation.

Migration Proposal (MP)

The purpose of the MP is to provide information about prerequisite work needed within the PSAP, expected costs, and funding provided by the Board for a NG9-1-1 solution. The goal of this document is to provide each PSAP/locality with all of the information needed to evaluate the NG9-1-1 solution and determine whether it will meet local needs. Though the Board is recommending the Fairfax contract with AT&T for NG9-1-1 services, each locality will need to determine the most appropriate path and may use other NG9-1-1 service provider contracts. Since the AT& T solution is the first NG9-1-1 solution deployed in Virginia, a locality that chooses a service provider other than AT&T is responsible for interoperability with the AT&T solution (see Appendix A).

ISP staff will prepare a proposal document for each PSAP and service provider that includes necessary NG9-1-1 implementation steps and recommended participants, a timeline for completing these steps, and related non-recurring and recurring costs to achieve an outcome of i3 geospatial 9-1-1 call routing. This proposal also provides an anticipated NG9-1-1 deployment schedule and anticipated funding.

Although the MP provides a path to achieve geo-spatial routing, regional needs may necessitate that a PSAP transition to NG9-1-1 before this outcome occurs. An implementation step, such as a CHE upgrade, may delay a PSAP's NG9-1-1 deployment date. To minimize legacy 9-1-1 service provider transition costs, all PSAPs currently served by a selective router pair need to transition within a short time period. In this case, a legacy PSAP gateway (LPG) can be set up as a transitional step. This would enable all PSAPs to transition at the same time and for the CHE upgrade to take place afterwards.

Only items that are specifically identified in the MP as necessary to deploy NG9-1-1 would be eligible for funding. As a result, many items eligible for funding in previous grant guidelines would no longer be funded. In addition, cash flow will be closely monitored to maintain the statewide NG9-1-1 deployment schedule established by the Board. As a result, some funding for connectivity to increase redundancy and diversity may need to be addressed after a PSAP transitions to NG9-1-1, as long as service is not degraded.

Proposal Acceptance Letter (PAL)

The PAL confirms the PSAP's acceptance of information contained in the MP and intent to deploy NG9-1-1, as well as the following information:

- PSAP's decision for a NG9-1-1 solution provider
- Interoperability issues related to NG9-1-1 solution provider decision
- Need for a transitional step with current NG9-1-1 deployment schedule
- Delay in increasing redundancy or diversity
- Use of billing agreements

By completing the PAL, a PSAP confirms they understand that a contract vehicle with a NG9-1-1 solutions provider needs to be executed within three months of the Board approving a funding request.

Funding Award Amendments

A PSAP can submit a funding award amendment request for the following reasons:

- An end-of-life notice for CHE is received by the PSAP with an effective date that occurs during the three year NG9-1-1 funding award period
- A previously unidentified issue impacting NG9-1-1 readiness

Funding amounts for CHE are provided in the Funding Amount section on page 11. ISP staff can process an award amendment for items with a non-material cost of less than $5,000. Items with a material cost of more than $5,000 would need to be approved by the Board. The need for a funding award amendment would be documented in the funding award recipient's progress report (see Progress Report section) prepared by ISP.

Payment Request Process

The PSAP Grant Program has a reimbursement cash disbursement policy. Payment requests may be submitted by award recipients after the award period begins and no later than 45 calendar days after the award period ends, (or next business day if the 45th day falls on a weekend or holiday) or as adjusted by any award extensions. Only invoices are acceptable forms of documentation and must reflect dates that fall within the actual award period. Payment requests must also be submitted in accordance with a PSAP's spending plan. This plan lays out when approved funding for each NG9-1-1 category will be available and is included in a funding award letter. Payment requests must be sent electronically to the PSAP Grant Program mailbox (psapgrants@vita.virginia.gov) on the appropriate form, along with an invoice.

Award recipients must wait until services are performed or goods are received, which must occur during the actual award period, and the corresponding invoices are received and/or paid in order to recover costs. For projects involving milestone payments, invoices may be submitted in accordance with executed contracts. A copy of the payment terms section of an executed contract that identifies the milestones must be included with the payment request. If a participant in a multi-jurisdictional project, other than the fiscal agent, is seeking reimbursement for an award-related expense, the participant must have the written approval of the fiscal agent in order for the reimbursement request to be processed.

In the event that that additional documentation is required from the funding grant recipient to process the payment reimbursement request, the Program Manager shall make the first contact with the funding recipient to request the information. Generally, such requests will be made by email, but can be made by telephone if easier with an email follow up for documentation. The Regional Coordinator for the locality will be copied on the request and follow up emails. The payment request will be held until the additional information is provided and not be partially paid, unless requested by the PSAP.

- If the required information is not received from the funding recipient within ten (10) business days of the request for additional information, the Program Manager will alert the Regional Coordinator for that locality to follow up with the funding recipient. The Regional Coordinator will contact the funding recipient to determine the cause for the delay in response and work with the Program Manager to determine a path forward to getting the required information or rejecting the request.

- If the required information is not received by the Program Manager within twenty (20) business days of the request for additional information, the Program Manager will alert the PSC Coordinator. The PSC Coordinator will determine if additional action is necessary.

- If the required information is not received by the Program Manager within thirty (30) business days of the request for additional information, the Program Manager will summarily reject the Funding Drawdown Request with an email to the grant recipient, copying the responsible Regional Coordinator and PSC Coordinator, asking them to resubmit the non-PEP drawdown request when all of the required information is available.

In addition, payment requests will be held until all required progress reports, or other Board required information, are received.

Progress Reports

Beginning July 1, 2019, ISP staff will prepare quarterly progress reports for all funding award recipients until the award is closed. These reports will be shared with the Grant Committee at the next scheduled meeting after the reports are completed.

Award Extension Requests

The Board will determine the process for PSAPs to request an award extension and ISP staff will advise award recipients.

Award Closure

The Board will determine the process for PSAPs to close their award and ISP staff will advise award recipients.

PSAP EDUCATION PROGRAM

Eligibility

Any Virginia primary PSAP is eligible to apply for and receive funding from the FY 21 PEP. Secondary PSAPs are not eligible for PEP funding. Grant funds are to be used to supplement the portion of local governments' budgets, not to supplant funds.

Funding Amounts

Approved grants in this program will receive funding from the PSAP Grant Program before any other funding priority. PSAPs have two funding options:

- $3,000 per primary PSAP for individual PEP requests
- $4,000 per primary PSAP for multi-jurisdictional PEP requests

Multi-jurisdictional PSAP education or training projects require that one eligible primary PSAP act as the "host" for the initiative. The "host" will be the fiscal agent responsible for fulfilling all grant requirements. All jurisdictions participating must be identified in a MJA signed by all parties.

PSAPs may receive an award for an individual PEP grant and participate in a multi-jurisdictional PEP grant in the FY 21 grant cycle. However, the multi-jurisdictional PEP grant award cannot be used to supplement an individual PEP grant award that has been exhausted during the grant award period.

Grant Award Period

The FY 21 PEP is an annual grant program with an award period that runs consistent with the Commonwealth of Virginia's fiscal year. The twelve month grant award period begins on July 1, 2020 and ends on June 30, 2021. All grant funds must be expended by the end of the grant award period. PEP grants are not eligible for extensions. The Board will approve the PEP awards at their January 2020 meeting.

Grant Cycle and Application

The FY 21 grant cycle for the PEP begins on July 1, 2019 and will remain open until 5 pm on October 1, 2019. PEP grant applications are available from VITA's ISP website.

Each PEP application must include the following:

- Description of how the education/training is 9-1-1/GIS specific and how this will benefit the employee(s) and/or PSAP(s)
- Breakdown of the funding allocation of the 9-1-1/GIS education/training opportunities
- Evaluation plan that describes how the PSAP will measure the extent to which employees of the grantee PSAPs received value from the education/training

How to Apply/Deadline

The FY 21 PEP application cycle begins on July 1, 2019. PEP applications must be submitted electronically to the PSAP Grant Program mailbox (psapgrants@vita.virginia.gov) using the appropriate form and with required supporting documentation by 5 pm on October 1, 2019.

Program Concept

The PEP funds registration/training fees, lodging, travel assistance (for VA APCO, VA NENA, and VAMLIS state conferences only), M & IE (meals and incidental expenses for all other conferences and training opportunities), required training course material, and certifications. Reimbursement for travel assistance and M & IE requires an overnight stay. Reimbursement information is available from VITA's ISP website. Reimbursement will only be made at the posted rate effective on the date of the training, plus applicable state and occupancy taxes based on the Commonwealth of Virginia Travel Guidelines.

Program Goals and Objectives

The PEP is designed so that all primary PSAPs will take advantage of in-person and online opportunities including subscription based learning programs. Education and training must be related to technology adoptions, ongoing management of technology hardware/software, career development specific to Public Safety Communications (PSC) and/or GIS personnel, and other relevant matters.

Payment Request Process

The PEP uses a cost recovery method of funding. In the Comprehensive Project Description section of the PEP grant application, the applicant will

provide a reasonable estimate of the funds to be used. The grantee will pay the costs of all allowable expenses. Within 30 calendar days of the end of the education/training event (or next business day if the 30th day falls on a weekend or holiday), the grantee must submit:

❑ Hotel receipt, conference/training registration receipt, and certificate of completion, if applicable. A conference registration form or a hotel reservation confirmation are not sufficient, and therefore, are not an acceptable form of documentation.

❑ Online education/training payment documentation (including a dated certificate of completion for any online training received).

❑ A list of all those attending the conference/training and the dates of attendance.

❑ A copy of the event agenda to determine the provided meals for subtraction from the per diem. This is not required for the standard in-state conferences as this is already known. Receipts are not required for meal reimbursement.

❑ A detailed invoice for all allowable expenses in association with an education/training opportunity.

❑ EXCEPTION: Grantee may seek reimbursement for subscription courses at the end of the grant award year (June 30th), but within 45 days of June 30th of the expiring grant award year.

  ▪ Payment of invoices for these programs cannot overlap fiscal years and cannot extend beyond the grant award period.

  ▪ To the extent practical, a single reimbursement request should be submitted for subscription based learning programs.

In the event that that additional documentation is required from the grant recipient to process the payment reimbursement request, the Program Manager shall make the first contact with the grant recipient to request the information. Generally, such requests will be made by email, but can be made by telephone if easier with an email follow up for documentation. The Regional Coordinator for the locality will be copied on the request and follow

up emails. The payment request will be held until the additional information is provided and not be partially paid, unless requested by the PSAP.

- – If the required information is not received from the grant recipient within ten (10) business days of the request for additional information, the Program Manager will alert the Regional Coordinator for that locality to follow up with the grant recipient. The Regional Coordinator will contact the grant recipient to determine the cause for the delay in response and work with the Program Manager to determine a path forward to getting the required information or rejecting the request.

- – If the required information is not received by the Program Manager within twenty (20) business days of the request for additional information, the Program Manager will alert the PSC Coordinator. The PSC Coordinator will determine if additional action is necessary.

- – If the required information is not received by the Program Manager within thirty (30) business days of the request for additional information, the Program Manager will summarily reject the Grant Drawdown Request with an email to the grant recipient, copying the responsible Regional Coordinator and PSC Coordinator, asking them to resubmit the PEP drawdown request when all of the required information is available.

PEP grant payment requests received without all required receipts will be considered null submissions after 30 calendar days of notification and non-receipt of required documentation.

In addition, grant payment requests will be held until all progress reports, or other Board required information, are received.

TEXT-TO-9-1-1 PROGRAM

Eligibility

Any Virginia primary PSAP is eligible to apply for and receive funding from the Text-to-9-1-1 Program. Any PSAP that has already implemented Text-to-9-1-1 is not eligible for Text-to-9-1-1 Program funding. However, PSAPs with a TDD-based solution are eligible to apply for funding to replace their current solution with a web-based or direct IP solution.

Funding Amounts

Eligible PSAPs can receive up to $50,000 in funding. Funding from the Text-to-9-1-1 Program replaces any funding identified in a PSAP's NG9-1-1 Migration Plan or included in a PSAP's NG9-1-1 funding award.

Funding Award Period

Funding awards are for three years from the date approved by the Board, or until the PSAP deploys NG9-1-1, whichever is sooner.

Funding Cycle and Application

The funding cycle for the Text-to-9-1-1 Program begins on July 1, 2019 and will remain open throughout the NG9-1-1 deployment period. Text-to-9-1-1 funding applications are available from VITA's ISP website.

How to Apply/Deadline

Funding applications will be reviewed and approved on an ongoing basis throughout the NG9-1-1 deployment period. Applications are due by 5 pm no later than 45 calendar days in advance of a scheduled Board meeting. Applications must be submitted electronically to the PSAP Grant Program mailbox (psapgrants@vita.virginia.gov) with required supporting documentation.

Program Concept

The Text-to-9-1-1 Program is a transitional funding program designed to enable PSAPs to implement SMS Text-to-9-1-1 prior to NG9-1-1 deployment

to meet the required implementation date of July 1, 2020. PSAPs can choose either a web-based or direct IP solution.

Program Goals and Objectives

The Text-to-9-1-1 Program is designed to ensure that all PSAPs that have not yet implemented SMS Text-to-9-1-1 have funding to implement this service by the July 1, 2020 and to maintain this service until NG9-1-1 deployment. Text-to-9-1-1 is a core feature of NG9-1-1.

Payment Request Process

The PSAP Grant Program has a reimbursement cash disbursement policy. Payment requests may be submitted by award recipients after the award period begins and no later than 45 calendar days after the award period ends, (or next business day if the 45th day falls on a weekend or holiday) or as adjusted by any award extensions. Only invoices are acceptable forms of documentation and must reflect dates that fall within the actual award period. Payment requests must be sent electronically to the PSAP Grant Program mailbox (psapgrants@vita.virginia.gov) on the appropriate form, along with an invoice.

Award recipients must wait until services are performed or goods are received, which must occur during the actual award period, and the corresponding invoices are received and/or paid in order to recover costs. For projects involving milestone payments, invoices may be submitted in accordance with executed contracts. A copy of the payment terms section of an executed contract that identifies the milestones must be included with the payment request. If a participant in a multi-jurisdictional project, other than the fiscal agent, is seeking reimbursement for an award-related expense, the participant must have the written approval of the fiscal agent in order for the reimbursement request to be processed.

In the event that that additional documentation is required from the funding grant recipient to process the payment reimbursement request, the Program Manager shall make the first contact with the funding recipient to request the information. Generally, such requests will be made by email, but can be made by telephone if easier with an email follow up for documentation. The Regional Coordinator for the locality will be copied on the request and follow up emails. The payment request will be held until the additional information is provided and not be partially paid, unless requested by the PSAP.

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Coordinator will contact the funding recipient to determine the cause for the delay in response and work with the Program Manager to determine a path forward to getting the required information or rejecting the request.

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In addition, payment requests will be held until all required progress reports, or other Board required information, are received.

Progress Reports

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Award Extension Requests

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Award Closure

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APPENDIX

APPENDIX A: INTEROPERABILITY REQUIREMENTS

Interoperable Definition for Commonwealth of Virginia NG9-1-1 ESInet[1]

Below is a summary of requirements for a NG9-1-1 Solutions provider other than AT & T to be considered interoperable with the Fairfax County NG9-1-1 ESInet ("Commonwealth's ESInet") solution.

- Jurisdiction's ESInet solution will be responsible to ensure integrated text, voice, and data interoperability with the state's NG9-1-1 solution. This includes, but is not limited to, the following requirements:
  - o Establishing redundant, diverse ESInet and Next Generation Core Services (NGCS) connectivity to the Commonwealth's ESInet at locations defined by VITA.
  - o Providing NENA standards based border control function (BCF) at the jurisdiction's NG9-1-1 provider's edge.
  - o Ensuring NOC to NOC communications SOPs are established between the jurisdiction and the Commonwealth ESInet.
  - o Lab-to-lab testing in non-live environment with current production software releases to verify interoperability.
  - o Support Transitional paths to NG9-1-1 to allow transfer of calls to any neighboring jurisdiction (support legacy call transfer to an ESInet [via interworking IPSR[2] to i3[3] protocols] and support inbound ESInet calls to a legacy PSAP [via interworking i3 to IPSR protocols]).
  - o Support SIP interconnection with use of SIP call delivery and use of i3 protocols including but not limited to PIDF-LO, LoST, HELD, GET, SIP REFER, Subscribe/Notify messaging, and EIDD as defined by the Commonwealth's NGCS provider's specification.
  - o Provide an ESInet solution inclusive of pricing for text-to-911 Text Control Center services. This solution must provide the ability to transfer texts received initially at the first PSAP to any other Commonwealth PSAP, regardless of NG9-1-1 ESInet/NGCS services provider.

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[1] ESInet (Emergency Services IP Network) – a managed IP network used for emergency services communications that can be shared by all agencies. In the context of this definition, the Next Generation Core Services (NGCS) that operate on the ESInet are included.

[2] IPSR replaces the functions of legacy selective routers by routing 9-1-1 calls via Internet Protocol (IP) to a PSAP using existing mechanisms (e.g., ANI, p-ANI, ESRK) and converts the call to SIP signaling.

[3] I3 is shorthand terminology for the ESInet and NGCS and systems that are in conformance with NENA-STA-010.