Alexandria Department of Emergency and Customer Communications (DECC)

Technical and Operational Assessment
Pandemic Operations

Submitted to:
Alexandria, Virginia

By

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Executive Summary

The Alexandria Department of Emergency and Customer Communications (DECC) commissioned the Association of Public Safety Communications Officials, International (APCO) to conduct an assessment of their Emergency Communications Centers operations during the COVID-19 pandemic. Specifically, the agency was interested in an in-depth review of both technical and operational procedures put into effect to assist in ensuring continuity of operations while also protecting DECC personnel by deploying a remote call taking solution.

The COVID 19 Pandemic has created a variety of challenges to operational, technical, and management requirements. In a first-of-its kind approach, Alexandria DECC took a bold step forward in creating, testing, implementing, and operationalizing a remote call taking option for their emergency and non-emergency calls. Alexandria was the first agency to operationalize this remote call taking capability. Not only did they do so during the initial pandemic response phase, but since implementing this plan, in conjunction with their comprehensive response approach, they have gone operational at least one additional time in response to positive COVID-19 tests of working personnel. While other centers have faced staffing shortages of 25% and more, with no viable operational alternatives, Alexandria has maintained a consistent operational pace and remained fully capable of handling calls through a combination of Isolation Teams, geographic diversity among their centers, and the implementation of remote call taking.

Local leaders made a definitive decision on how to approach Pandemic response based operational requirements and took appropriate steps to do so. The "roadmap" for implementation of this plan included:

1. Determining the technical options, and viability, for a remote call taking option.
2. Developing an approach and agreement for both vendors and the agency.
3. Developing a concept of operations plan. Articulating the mission and objectives of the plan and preparing an implementation strategy. That strategy included:
    a. Implementation of an "Isolation Team" plan
    b. Initial deployment of remote call taking equipment.
    c. Testing of non-emergency calls
    d. Testing of emergency calls
    e. Relationship of remote call takers to on premise call takers and dispatchers
    f. Dispatch options
    g. Finalizing Implementation / Roll-out plan
    h. Operationalizing the remote call taking plan

4. Developing a strategic plan for operations, facilities, and technology needs (backup and primary locations) specific to the remote call taking options and overall pandemic response.
5. Ensuring that the budget supported the plan. Both the Isolation Team and the remote call taking options cost money that was not budgeted for. Overtime became an issue as well.

Maintaining continuity of operations in an ECC during unprecedented times such as these presents unique challenges. The aim of this report is to provide ECCs around the nation, and potentially around the globe, with a model based on the successful approach taken by Alexandria DECC.

Based on the analysis throughout this document, the success of two real world deployments, and the ongoing use of the remote call taking system the review team concluded that the Alexandria DECC model was, and continues to be, highly successful in providing for quality call taking and response services while ensuring the continuity of operations for DECC and the ongoing safety of their personnel.

Acknowledgements

APCO International would like to thank the following personnel for their contributions to this report:

- Renee Gordan – Director, Alexandria DECC
- Douglas Campbell – Deputy Director, Alexandria DECC
- Eric Parker - Radio Systems
- Jeff Wobbleton – Assistant Director, Admin/Information Technology
- Tony Dunsworth - Database Administrator, CAD, and Analytics
- Karl Barnes - Public Safety Network Engineer
- Angie Reese - 9-1-1 Phone Manager, Arlington, VA

Special Acknowledgement

Robert "Bob" Bloom was a fixture at the Alexandria DECC. Serving as the Public Safety Systems Administrator, this project was referred to as "Bob's brainchild" by everyone the APCO Consulting Services (ACS) Team spoke with.

Bob was also an active, valued member of APCO - working countless hours on everything from APCO conferences to advocacy for the advancement of 9-1-1 on a nationwide level. The authors of this report knew Bob, had the opportunity to work with him on more than one occasion, and were proud to call him part of our APCO family.

Tragically, Bob passed away suddenly and unexpectedly prior to the onsite interviews and writing of this report. APCO and the ACS team join the Alexandria DECC family in mourning Bob's loss and are honored that this report is dedicated to his memory.

Program Goals

ACS builds on APCO International's commitment to member services. The focus of this review is to provide the findings and recommendations for key officials about the specifics of the pre-defined scope of work.

When constructing this report, all aspects of the ECC related to technology were taken into consideration. This includes an assessment of the current operation, service delivery, financial considerations, reliability, and resiliency considerations, including continuity and disaster recovery, security, and interoperability.

Peer-to-Peer Reviews

As peers in the public safety and public service realms, experienced communications officials and APCO members who have successfully managed ECCs were selected to perform these reviews. The skillset of the review team is matched with the jurisdiction's needs and the scope of work desired.

The review team for this project was selected from a wide range of public safety professionals. The goal of selecting a team specifically matched to each review is to ensure that they all have the skill sets and experience levels that match the objectives of the review as articulated in the scope of work.

APCO Team Members

The APCO Consulting Services Team (herein, "review team") consisted of three members with a notable amount of ECC operational and technical experience:

- Gerald "Jay" English, Chief Technology Officer, APCO International (onsite interviews and assessment)
- Megan Bixler, Standards and ACS Manager, APCO International
- Steve Leese, Senior Consultant, APCO International

Scope of Work Summary

The scope of work identifies the following components for review and recommendations by the APCO team:

Technology Assessment – Remote Work Capability

- Inventory current Emergency Communications Center (ECC) mission critical technology, with specific focus on how this technology enables remote call taking capabilities. Inventory included:
  - LMR infrastructure, connectivity, consoles, interoperability if applicable
  - CAD system
  - RMS system
  - Logging recorders
  - 9-1-1 telephone systems and networks
    - Identify and assess how the Alexandria ECC 9-1-1 call handling equipment and communications systems have been utilized to facilitate remote call taking capabilities.
      - Examine connectivity needs at call taker remote locations.
      - Examine security issues at ECC and call taker remote locations.
- Examination of Continuity of Operations plan and of how remote call taking plays into this plan.
- Detailed analysis of how remote call taking has been operationalized to include:
  - Technical needs/issues
  - Regulatory / Compliance issues (CJIS, HIPAA, etc.)
  - Cybersecurity - both on premise and remote

Analysis of Call Taking and Dispatch Operations – Remote Operations Challenges

- Status Quo
    - Examine state of radio system and licensing.
    - Determine interconnect requirements for remote personnel.
    - Determine licensing restrictions, or lack thereof.
- Determine potential path(s) forward to facilitate dispatch capabilities in addition to call taking.

Service Levels and Benefits of Remote Call Taking

- Identify service level requirements and expectations of stakeholders.
- Identify perceived concerns of stakeholders associated with remote operations.
- Identify potential service level improvements or degradations associated with remote operations.
- Address any impact on the ability to process and dispatch 9-1-1 calls for emergency response.
- Assess the potential to increase this capability on a more permanent basis.
    - Potentially enhance 9-1-1 and emergency communications workload surges
    - Enable ability to react rapidly in the event of emergencies requiring evacuation, relocation, or separation of personnel (as with COVID-19)
- Identify operational service, preparedness and response benefits that may be associated with expansion of remote work capabilities.
- Identify operational service, preparedness and response risks that may be associated with expansion of remote work capabilities.

Potential Future Capabilities and Development of Best Practices

- Identify potential future capabilities / expansion for remote call taking and possibly dispatching calls for service
- Potential for sharing technologies with other agencies.
- Determine Best Practices that can be applied to other agencies in order to enable and/or assist in implementing similar capabilities.

Methodology

The primary process used to solicit feedback on the issues and the challenges of pandemic operations was in person interviews. The interviews were conducted both face to face and remotely (via Microsoft Teams meetings) with a number of DECC staff in a wide variety of positions within the ECC. From senior leadership to rookie telecommunicators, multiple viewpoints were solicited.

The findings and recommendations contained in this report are based on industry's best practices, standards and feedback from staff and stakeholders.

In addition to interviews, the methodology of this study included the following components:

- Technology assessment
- Documentation review
- Observations and equipment inspection
- Report development

Report Organization

This report is organized into the following sections:

- Section 1: Organization Overview
- Section 2: Technology Overview
- Section 3: Security Considerations
- Section 4: Analysis of Dispatch Options During Pandemic Operations
- Section 5: Recommendations and Best Practices
- Appendix A – Alexandria DECC COOP
- Appendix B – Alexandria Pandemic Response Statistics
- Appendix C – List of Abbreviations
- Appendix D – NIST Security Guidelines
- Appendix E – Other Documents, Studies and Standards Consulted
- Appendix F – Tables of Figures
- Appendix G – Table of Tables

Section 1: Organization Overview

The Alexandria DECC provides the critical link from citizens to responders for all types of emergencies, and for many non-emergency calls for service. This section provides an organizational and operational overview of the DECC. This data provides background, and context, for the larger examination of DECC planning, implementation, and capabilities related to the Pandemic response and to the overall contingency planning and emergency operations undertaken by the agency. Alexandria is located in close proximity to the Nation's Capital and is considered an integral part of the Washington D.C. Metropolitan Area (Figure 1).

"Alexandria is an independent city in the Commonwealth of Virginia in the United States. As of the 2010 census, the population was 139,966, and in 2020, the population was estimated to be at 159,200. Located along the western bank of the Potomac River, Alexandria is approximately 7 miles (11 km) south of downtown Washington, D.C.

Like the rest of Northern Virginia, as well as Central Maryland, modern Alexandria has been influenced by its proximity to the U.S. capitol. It is largely populated by professionals working in the federal civil service, in the U.S. military, or for one of the many private companies which contract to provide services to the federal government. One of Alexandria's largest employers is the U.S. Department of Defense. Another is the Institute for Defense Analyses. In 2005, the United States Patent and Trademark Office moved to Alexandria, and in 2017, so did the headquarters of the National Science Foundation.

The historic center of Alexandria is known as Old Town. With its concentration of boutiques, restaurants, antique shops, and theaters, it is a major draw for all who live in Alexandria as well for visitors. Like Old Town, many Alexandria neighborhoods are compact and walkable.

A large portion of adjacent Fairfax County, mostly south but also west of the city, has Alexandria mailing addresses. However, this area is under the jurisdiction of Fairfax County's government and separate from the independent city. The city is therefore sometimes referred to as the "City of Alexandria" to avoid confusion (see the "Neighborhoods" paragraph below). Additionally, neighboring Arlington County was formerly named "Alexandria County" before it was renamed by the Virginia General Assembly in 1920 to reduce confusion with the city." [1]

[1] https://en.wikipedia.org/wiki/Alexandria%2C_Virginia

Figure 1- Alexandria, VA

According to the United States Census Bureau, the city has a total area of 15.5 square miles (40.1 km^2), of which 15.0 square miles (38.9 km^2) is land and 0.42 square miles (1.1 km^2), or 2.85%, is water. Alexandria is bordered on the east by the Potomac River, on the north and northwest by Arlington County, and on the south by Fairfax County.

A more detailed analysis of the scale, and scope, of services provided by the DECC, based on survey data obtained directly from Alexandria DECC follows in Table 1:

Demographics: Based on US Census Data

Year:	**Population**
2017	142,548
2018	149,900
2019	155,000

Service Area	
Total Service Square Miles:	15
Service Area (i.e., rural, suburban, urban, etc.)	City, Urban

No. Agencies Served	#	No. Agencies Served	#
Law Enforcement	2	Combined Fire/EMS	
Fire only (paid)	1	Fire only (volunteer)	
Emergency Medical Services (EMS)	1	Public Utilities	
Weather Info. / Emergencies	1	Animal Control	1
Coroner		Transportation	
Other:			

Agencies Served	
Law Enforcement	• Alexandria PD, Alexandria Sheriff's Office
Fire (Paid)	• Alexandria FD
Fire (Volunteer)	•
EMS	• Alexandria FD
Public Utilities	•
Animal Control	• Alexandria Animal Welfare League
Transportation	•
Other	•

Field Units Served:	
Law Enforcement	70
Fire (Paid)	40
Fire (Volunteer)	
EMS	15
Public Utilities	
Animal Control	5
Transportation	
Other	

Call and Dispatch Volume Data:

Annual Call Volume	2017	2018	2019
9-1-1 Emergency Calls	64,145	65,137	66,307
Non-Emergency Calls	224,491	223,320	221,886

Annual Dispatch Volume	2017	2018	2019
Police	115,525	110,960	112,607
Fire	7,891	8,946	8,920
EMS	12,784	13,327	13,772
Other			

**The annual dispatch volume does not include self-initiated activity (e.g., building check, traffic stops, etc.)*

Self-Initiated Activity Annual Volume	2017	2018	2019
Police	10,011	8,984	8,824
Fire	51	86	54
EMS	S/A	S/A	S/A
Other			

**This volume does not include the Annual Dispatch Volume numbers above*

ECC Workstations	Provide the total number of workstations in your ECC.
Call-taker	34
Dispatcher	21
Combined Call-taker/Dispatcher	21
Supervisor	3
Other	

Table 1- Alexandria DECC Demographics and Service Specifics

The ECC appears to be well equipped and staffed to provide public safety communications services for its population base. Public Safety Telecommunicators (PSTs) on duty answer and process 9-1-1 calls for service and perform other dispatch services for City.

Calls for Service

A typical call for service originates when a citizen dials either an emergency number, such as 9-1-1, or a non-emergency number, in Alexandria's case that would include 3-1-1. This call is dubbed the first layer of any response by an agency. In many ECCs, the call-taking and dispatching functions are interwoven. In others, they are both performed in the same center by different personnel. The latter is the case for the Alexandria DECC. The following high level call processing steps are in place at Alexandria (Figure 2):

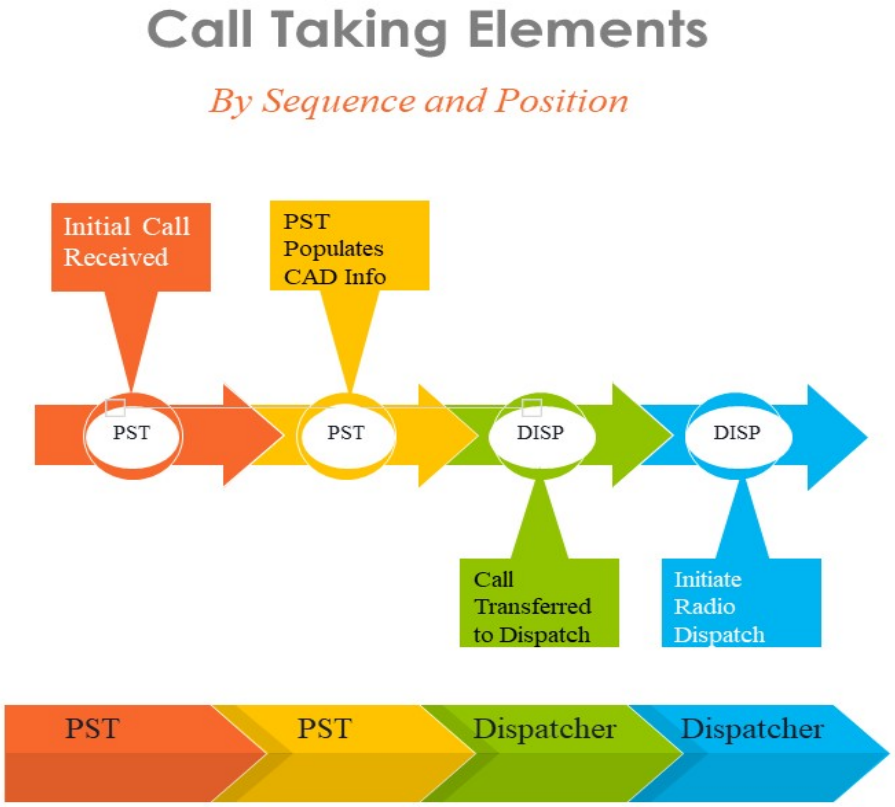

Figure 2 - Call Processing Steps

While the PST is gathering information, they are populating the Computer Aided Dispatch (CAD) record and preparing the call for transfer to a dispatcher. Once the call has received sufficient data to determine the nature of the call, a verified address, and determine an appropriate related response, the call information (not the caller) is sent to a dispatcher for processing. The dispatcher then initiates a call for service over the radio and continues to update call and response information into the CAD system. When the call is finished, the dispatcher finishes processing the call in CAD and enters the information into the CAD log. These steps are aligned with the most current version of APCO's American National Standard (ANS) Incident Handling Process.

Data obtained from the ECC regarding calls for service is displayed in Table 2. The data reaches over a three-year period (2017-2019).

Call and Dispatch Volume Data:

Annual Call Volume	2017	2018	2019
9-1-1 Emergency Calls	64,145	65,137	66,307
Non-Emergency Calls	224,491	223,320	221,886

Annual Dispatch Volume	2017	2018	2019
Police	115,525	110,960	112,607
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Fire	51	86	54
EMS	S/A	S/A	S/A
Other			

**This volume does not include the Annual Dispatch Volume numbers above*

ECC Workstations	Provide the total number of workstations in your ECC.
Call-taker	34
Dispatcher	21
Combined Call-taker/Dispatcher	21
Supervisor	3
Other	

Activity	2017	2018	2019
9-1-1/Emergency Calls Received	64,145	65,137	66,307
VoIP Calls Received	0	0	0
TDD/TTY Calls Received	3	1	1
Text-to-9-1-1 Sessions*	41	103	107
Administrative/Non-Emergency Calls Received	224,491	223,320	221,886
Other Emergency Calls Received	2,367	2,765	2,722
Total Number of Wireless Calls	53,419	54,341	55,801
Total Incoming Calls – All lines	288,636	288,457	288,193
Total Incoming/Outgoing – All lines	346,946	345,130	346,523
Average 9-1-1 Answer Time (In seconds)**	8	9	10
Number of 9-1-1 Call Transfers (In-bound)	2,367	2,765	2,722
Number of 9-1-1 Call Transfers (Outbound)	3,306	3,375	3,100
Wireline Call %	16%	16%	15%
Wireless Call %	84%	84%	85%
CJIS (NCIC/local) Inquiries	47,352	49,634	53,568

CJIS File Maintenance (e.g., Entries, Mods, Cancels, etc.)	5,642	5,440	5,821
Administrative Messages	212	187	222

Table 2- Alexandria DECC Call Volumes

Analysis:

With the data provided, the three-year combined total of emergency and non-emergency calls for services is 865,286. Putting this substantial number of calls into perspective requires that the reader consider that this total reflects a combination of wireline and wireless 9-1-1, 10-digit emergency numbers, Telecommunications Device for the Deaf/Teletypewriter (TDD/TTY), and Voice over Internet Protocol (VoIP). The percentage of emergency calls received from wireless devices in 2019 came in at 85%. This is consistent with national trends. Alexandria DECC handles considerably more non-emergency/administrative calls than emergency calls, which is also consistent with national trends.

Primary and Ancillary Duties

Typically, the primary duties within the ECC involve the processing of 9-1-1 emergency calls, answering non-emergency administrative or 10-digit calls, dispatching first responders, and performing other duties. Other duties are often referred to as ancillary duties. ECC staff may be responsible for greeting visitors, handling administrative calls after normal business hours, monitoring security cameras, and providing other administrative and record support services.

Task	Y/N	Task	Y/N
Call Taking (9-1-1)	**Y**	Dispatch (Police)	**Y**
Call Answering (administrative)	**Y**	Dispatch (Fire)	**Y**
Call Answering (Text-to-9-1-1)	**Y**	Dispatch (EMS)	**Y**
Call Answering (Other)	**Y**	Dispatch (Public Utilities)	**N**
Traffic Monitoring	**N**	Dispatch (Animal Control)	**Y**
Warrant/Article Entry/Confirm	**Y**	Dispatch (Other)	**Y**
NCIC/state checks	**Y**	Monitor Alarms	**N**
Emergency Notification	**Y**	Monitor CCTV	**N**
Other tasks performed	**Y**	Monitor Environmental Control Systems	**Y**

Table 3 - Duties of PSTs in Alexandria

***Analysis*:** While on the site visit, the review team was able to collect ancillary duty information from ECC staff. The ECC performs numerous records functions and

other job-related and non-job-related ancillary tasks. Some of the ancillary duties occupy significant time for PSTs on duty while they are still responsible for actively answering 9-1-1 calls. Ancillary duties assigned to Alexandria's PSTs include, but are not limited to the following:

- Virginia Criminal Information Network (VCIN)/ National Crime Information Center (NCIC) entries
- After-hours calls for police, fire, and public utilities.
- Wrecker services
- Animal Control Dispatch
- Emergency Notifications (commonly referred to as "reverse 9-1-1")
- Records
    - Enter citations and warnings for patrol officers, code enforcement, and animal control.
    - Enter warrants into RMS.
    - Bike registration for the town
    - Sex offender registry
- Maintain multiple logs
    - Arrest
    - Criminal history
    - Incidents

***Consideration*:** Alexandria leadership should continue to ensure that any ancillary duties that distract the PST from their primary work of answering 9-1-1 calls and handling radio traffic are scheduled at a time when additional staff is available. All primary and secondary job duties should be identified and accounted for in the COOP. However, it is important to note that Alexandria DECC accounts for the majority of this additional tasking with appropriate staffing and that during remote operations, rather than being short-staffed due to pandemic considerations, the agency was able to maintain adequate staffing and continued to ensure timely processing of calls.

Section 2: Technology Assessment

A technology assessment of the Alexandria DECC was performed. The assessment included an inventory of existing technologies and a comparison to best practices, standards, and future considerations. A more detailed analysis of this technology, as it relates to the implementation of Pandemic Operations, will follow in subsequent sections of the report. The technology assessment is broken into sections for review purposes.

The following basic land mobile radio technology assessment (Table 4) covers the initial survey completed by Alexandria DECC.

LMR Infrastructure

Land Mobile Radio System	
Vendor	Motorola
Manufacturer	Motorola
Model/Version	7.17
Year Installed	2012
Date of Last Update	2020
Number of consoles per discipline	1

Land Mobile Radio System		
Equipment	**Manufacturer**	**Age**
Fixed End (transmitters, repeaters, etc.)	Motorola	10
Mobiles	Motorola	0 to 8 years
Base Stations	Motorola	0 to 10 years
Portables	Motorola	0 to 8 years

Land Mobile Radio System – By Agency Supported	
Agency	**Band (VHF/UHF/800 MHz**
Law Enforcement	800 MHz
Fire	800 MHz
EMS	800 MHz
Do you have satellite receiver or repeater sites? Please provide the location.	Yes, within the city
Do you support or service other agency radios? If so, what are their frequency band	VHF, UHF

Land Mobile Radio System - Radio Channel Utilization	
Radio channels/talk groups used regularly (Daily or more than weekly)	4
Radio channels/talk groups used occasionally (Major events, disasters, task force, etc.)	5

Table 4 – Land Mobile Radio Technology Inventory

Analysis: Alexandria DECC uses a Motorola P 25 compliant, 800-megahertz (MHz) system to support their communications throughout the City and surrounding areas. They also utilize 150 MHz band, and 2.4 GHz band systems.

Police, Fire and EMS agencies all operate on the 800 MHz system.

The City routinely utilizes four talk groups, with five talk groups used occasionally, or as required based on events.

The agency provides primary radio system support for the Police department which includes programming and distribution of equipment. The local radio team also handles four facilities and administrative support (programming but no maintenance) for the Fire department. A local radio shop, Wireless, provides infrastructure maintenance and support and also maintains the dispatch consoles. There are four radio sites (not including repeater and tower sites). The master site is located at the Police Headquarters building (location of DECC). The Prime site is located at the Masonic Temple in Alexandria. The four sites cover a 16-square mile area.

Licenses

As part of this technology assessment, an analysis of frequency licensing was also performed. Proper licensing is important to support mission critical radio communications.

Analysis: Upon searching through the Federal Communications Commission's (FCC) Universal Licensing System (ULS) records, six relevant call signs directly related to public safety wireless services were found under an FCC Registration Number (FRN) associated with the City of Alexandria. The call sign information is shown below in Table 5.

FCC Universal Licensing System Database: Alexandria, VA

Callsign	File Number	Status (Purpose)	Radio Service	FRN	Name	City	State
KA9678		Active	PW (Public Safety Pool-Conventional)	2036242	City of Alexandria	ALEXANDRIA	VA

KZE600		Active	PW (Public Safety Pool-Conventional)	2036242	City of Alexandria	ALEXANDRIA	VA
WNFS909		Active	YE (Trunked-Natl-Reband)	2036242	City of Alexandria	ALEXANDRIA	VA
WPHX997		Active	PW (Public Safety Pool-Conventional)	2036242	City of Alexandria	ALEXANDRIA	VA
WQPG622		Active	GE (Conv-Natl-Rebanding)	2036242	City of Alexandria	ALEXANDRIA	VA
WQQE511		Active	PW (Public Safety Pool-Conventional)	2036242	City of Alexandria	Alexandria	VA

Table 5 - Alexandria FCC Licensing Information

Call Sign KA9678 is in the 150 MHz band and is assigned a fixed location. It is classified as PW - Public Safety Pool, Conventional. For mobile services, the license extends for a 32.0 km radius around the assigned fix location.

Call Sign KZE600 is assigned a fixed location. It is classified as PW - Public Safety Pool, Conventional. For mobile services, the license extends for an unspecified radius around the assigned fix location.

Call Sign WNFS909 is in the 800 MHz band, and is assigned four (4) fixed locations. It is classified as PW - Public Safety Pool, Conventional. For mobile services, the license extends for an unspecified radius around the assigned fix location.

Call Sign WPHX997 is in the 2.4 GHz band and is assigned as a mobile location. It is classified as PW - Public Safety Pool, Conventional.

Call Sign WQPG622 is in the 800 MHz band, and is assigned two fixed location. It is classified as PW - Public Safety Pool, Conventional. For mobile services, the license extends for a 32.0 km radius around the Masonic Temple location.

Call Sign WQQE511 is in the 400 MHz band, and is assigned as a mobile service. It is classified as PW - Public Safety Pool, Conventional. The license extends for a 32.0 km radius around the center point.

Transmit heights of each license could not be validated but are assumed to be in compliance based on the tower height and the heights observed on the licenses.

The NCR is in a transitional state with regard to full P25 Interoperability amongst the multiple agencies in the area. Alexandria operates its Motorola system as a separate entity however, interoperable communications is the ultimate goal for

Alexandria and the other agencies in the region. According to open source articles, while there are still some challenges, progress is being made:

"ISSI Implementation & Integration: National Capital Region
When used properly with primary P25 LMR radios, ISSI technology is a valuable tool that can facilitate greater interoperability in the NCR. For this reason, NCR stakeholders are currently working together on developing proper governance structures to build a common foundation for all users to use ISSI in a way that does not risk compromising any existing communications systems.

Currently, the NCR, through the Metropolitan Washington Council of Governments' (MWCOG) Interoperable Communications Regional Programmatic Working Group (IC RPWG), is working with jurisdictions and stakeholders to fully integrate ISSI technology as a secondary system and provide regional capacity. The working group is developing a project plan for configuration of ISSI technology with full functional capability before the Washington Metropolitan Area Transit Authority's (WMATA) Metrorail Public Safety Radio System (PSRS) replacement is completed in 2021.

ISSI technology implementation is expanding across the NCR, most notably in Arlington County, Alexandria, Fairfax County, Prince William County, and Loudoun County. WMATA purchased hardware to allow for Metrorail interconnectivity with jurisdictional partners, and additional connections for use with other potential partners such as D.C., Montgomery County, and Prince George's County. Prince William County and Fairfax County tested the ISSI technology to ensure that it functions properly if a P25 system malfunctions and found the test to be successful.

The Interoperable Communications Regional Programmatic Working Group (IC RPWG) brings together the National Capital Region's interoperability partners to enhance the preparedness, responsiveness, and safety of communities by seamlessly sharing data, communications, information, and resources across jurisdiction and discipline boundaries and practicing collaborative decision-making. The IC RPWG works toward this vision by implementing a strategy to address focus areas and objectives of the region, with the support of the Metropolitan Washington Council of Governments (MWCOG) Department of Homeland Security and Public Safety (DHSPS). The MWCOG DHSPS fosters collaboration and provides subject matter experts and decision-makers with the tools needed to make sound financial, resource, and programmatic decisions regarding regional homeland security preparedness, response, and recovery."[2]

It should be noted that the Northern Virginia area received an ISSI Grant to implement ISSI capabilities. Alexandria has successfully created and tested interoperability templates as a result.

[2] https://www.domesticpreparedness.com/resilience/evolving-needs-interoperable-communications/

Considerations: The realization of truly interoperable voice systems, in conjunction with interoperable 9-1-1 and CAD systems, has the potential to revolutionize emergency communications in the NCR. As demonstrated by the efforts being made with P25 systems on the radio front, and by the implementation of remote call taking, discussed later in this report, Alexandria is on the forefront of these emerging technologies. It is important that progress continue on all fronts to move Alexandria and its neighboring agencies closer to true interoperability.

CAD and RMS

The CAD system was examined and reviewed at a high level (Table 6). The DECC uses Central Square Inform CAD. They utilize Hexagon for Records Management Services (RMS) for Law Enforcement and High Plains for RMS supporting Fire/EMS.

CAD System - Does the ECC use a CAD system? If yes, please provide the following:	
Vendor	Central Square
Manufacturer	Tri-Tech
Model/Version	Inform CAD 5.8.26
Year Installed	2015
Date of Last Update	2020
Workstation OS	
Server OS	

CAD System Interfaces - Although you may have many of the systems listed, **Yes** or **No** indicates whether they are currently integrated with the CAD system:	
State/NCIC Interface	Yes
9-1-1 Interface	Yes
Workstation Interface	Yes
Automatic Vehicle Location	Yes
Mapping (Wireless Phase II)	Yes
Mobile Mapping	Yes
Emergency Medical Dispatch	Yes
Fire Mobile Data	Yes
Fire Station Alerting	Yes
Fire/EMS Records Management	Yes
Law Enforcement Mobile Data	Yes
Law Enforcement Field Reporting	Yes
Law Enforcement Records Management	Yes
Radio Console Interface (PTT / Emergency)	Yes

Logger (Screen capture / incident correlation)	Yes
TDD/TTY	Yes
Text, Photo, or Video Messaging	No
Paging System	Yes

CAD System Capability:	**Yes / No**
Is the CAD system interfaced to the 9-1-1 system or integrated to the workstation? If interfaced, what type? (Serial, data, etc.)	Yes
Does the CAD system have the ability to support police, fire, EMS, and call taking functions?	Yes
Does the CAD system have the ability to recommend units for dispatch?	Yes
Does the CAD system provide premise/hazard information?	Yes
Is there a redundant CAD server in place? If yes, where is it located?	Backup Center
What is the process for updating CAD and Geo-file information? (Please include who does the updates and how often.)	DBA

Law Records Management System	
Vendor	Hexagon
Manufacturer	Intergraph
Model/Version	
Year Installed	2015

Fire/EMS Records Management System	
Vendor	High Plains
Manufacturer	High Plains

Table 6 - Alexandria CAD

The Central Square Inform CAD system allows for external interfaces to 9-1-1 call servers for ALI information and ESRI mapping information, with these features being utilized today. All call information from the 9-1-1 call server is automatically transferred to the CAD system. Any mapping required is done via the internal GIS capabilities of the CAD system.

The CAD system is fully integrated with both RMS' and provides for real time integration, transfer, and logging of information between the two. This element is also critical to the success of remote call taking deployments.

It was key to the success of this deployment that call takers be able to login to, and operate, the CAD system in conjunction with the 9-1-1 call taking solution and RMS solutions just as if they were located in the physical ECC.

Voice Logging Recorder

Alexandria DECC utilizes an Eventide Nexlog 740 logging recorder system provided by Carolina Recorder. The logger was purchased and installed in 2019 and supports 256 channels of recording, of which 137 are currently being utilized. The system is both analog and IP (SIP) capable. The system records both phone and radio conversations (Table 7).

In addition, the agency utilizes the available instant recall recording/playback capability provided by their 9-1-1 equipment vendor via their Motorola VESTA system (Table 8).

Logging Recorder - Please provide the following for the ECCs logging recorder system.	
Vendor	Carolina Recorder
Manufacturer	Eventide
Model/Version	Nexlog 740
Year Installed	2019
Total # of Channels Available	256
# of Channels in Use	137
Can recorder capacity be expanded?	Yes
What does it record (radio, phone, video)?	Radio, phone
SIP (Session Initiation Protocol) Capable?	Yes
Does it provide instant recall capability at the console?	Yes
Date of Last Update	N/A
Service Provider	Verizon

Table 7 - Alexandria Logging Recorder

Instant Recall Recorder - Please provide the following for the ECCs instant recall recorder.	
Vendor	VESTA
Manufacturer	VESTA
Model/Version	VESTA 7.2
Year Installed	2019
Does it record radio calls?	Yes
How many minutes are held in IRR call buffer?	60
Date of Last Update	

Table 8 - Instant Recall Recorder

Analysis: The logging recorder system is relatively new, having been installed in the past few years. The system appears to meet the agencies current needs and is designed to accommodate expansion.

Considerations: With regard to the successful implementation of the remote call taking capabilities, the logging recorder turned out to be a key element. Not only was a solution for recording remote calls required, but it did not readily exist at the onset of the pandemic. Other agencies experienced challenges with this aspect of remote deployment and operations and as a result were not able to fully deploy the solution. Fortunately, according to the leadership team in Alexandria, both the in-house technical team and the Eventide vendor team worked together to create, test, and implement a solution. Without this effort, it is likely that the operationalization of the larger solution would not have been possible.

9-1-1 System

The agency's 9-1-1 call server is a Motorola Vesta 7.5. There are 26 call taking terminals for taking 9-1-1 calls in the primary dispatch center. There are 11 additional terminals located in the backup center. The primary and back up centers are configured in "hot standby" mode so that both centers are capable of taking calls at any time. The modern architecture of the Alexandria 9-1-1 call answering solution allowed for integration of remote call taking capabilities without any major modification to the core system.

Verizon provides thirteen wireline and fourteen wireless trunks for 9-1-1 traffic to Alexandria. As a part of routine, daily operations Alexandria transfers calls to, and receives transferred calls from, Washington D.C., Arlington County and Fairfax County, VA and Prince Georges County, MD. Supporting data contained in the survey conducted by ACS is included in Table 9.

9-1-1 System:

Item	Manufacturer	Model	Software Version	Install Date
Customer Premise Equipment (9-1-1 call answering equipment)	VESTA/Motorola	VESTA	7.2	12/2019

9-1-1 System Capability: Mark with an (**X**) 9-1-1 system capability.			
Primary ECC	**X**	Secondary ECC	**X**
Basic 911	**X**	Enhanced 911	**X**
Wireless Phase I	**X**	Wireless Phase II	**X**
VOIP 911	**X**	Text-to- 9-1-1	**X**

9-1-1 Network	
Who is your 9-1-1 network service provider?	Verizon
Who manages the ALI Database?	City GIS
Who manages the MSAG Database?	City GIS
Where are the MSAG Database preserved and stored?	City Servers
Did you purchase or lease your CPE?	Purchase
Does your agency have current plans to replace or upgrade the CPE in the next 12 – 24 months?	No
Number of 9-1-1 Trunks/Lines (How many are wireline, wireless or combined?)	Wireline: 13 Wireless: 14 Combined: 27
Is your 9-1-1 Equipment 20 digit ANI capable?	Yes
Can your 9-1-1 Equipment "rebid" ALI?	Yes
Does your 9-1-1 Equipment 'auto rebid'? If so, what is the timeframe that the system rebids?	No
ANI & ALI printers – number & location?	2 Main Center, backup center
How many 9-1-1 answering positions (i.e., workstations) does your ECC have?	37 (26 main center, 11 backup center).
Do other ECCs transfer 9-1-1 calls to you for Dispatching?	Yes
If yes, please list ECCs that transfer 9-1-1 calls to your ECC.	Washington DC OUC, Arlington County, VA, Fairfax County, VA, Prince Georges County, MD
Do you transfer 9-1-1 calls to another ECC for Dispatching?	Same as Above
If yes, please list ECCs you transfer to	

Table 9 - Alexandria 9-1-1 System Specifications

Alexandria shares a common Wide Area Network (WAN) architecture with neighboring Arlington County, VA. This WAN incorporates the VESTA systems from both agencies into a common transport network creating redundancy and resiliency as well as opening up opportunities for data sharing in the future. An illustration of this WAN is found in Figure 3.

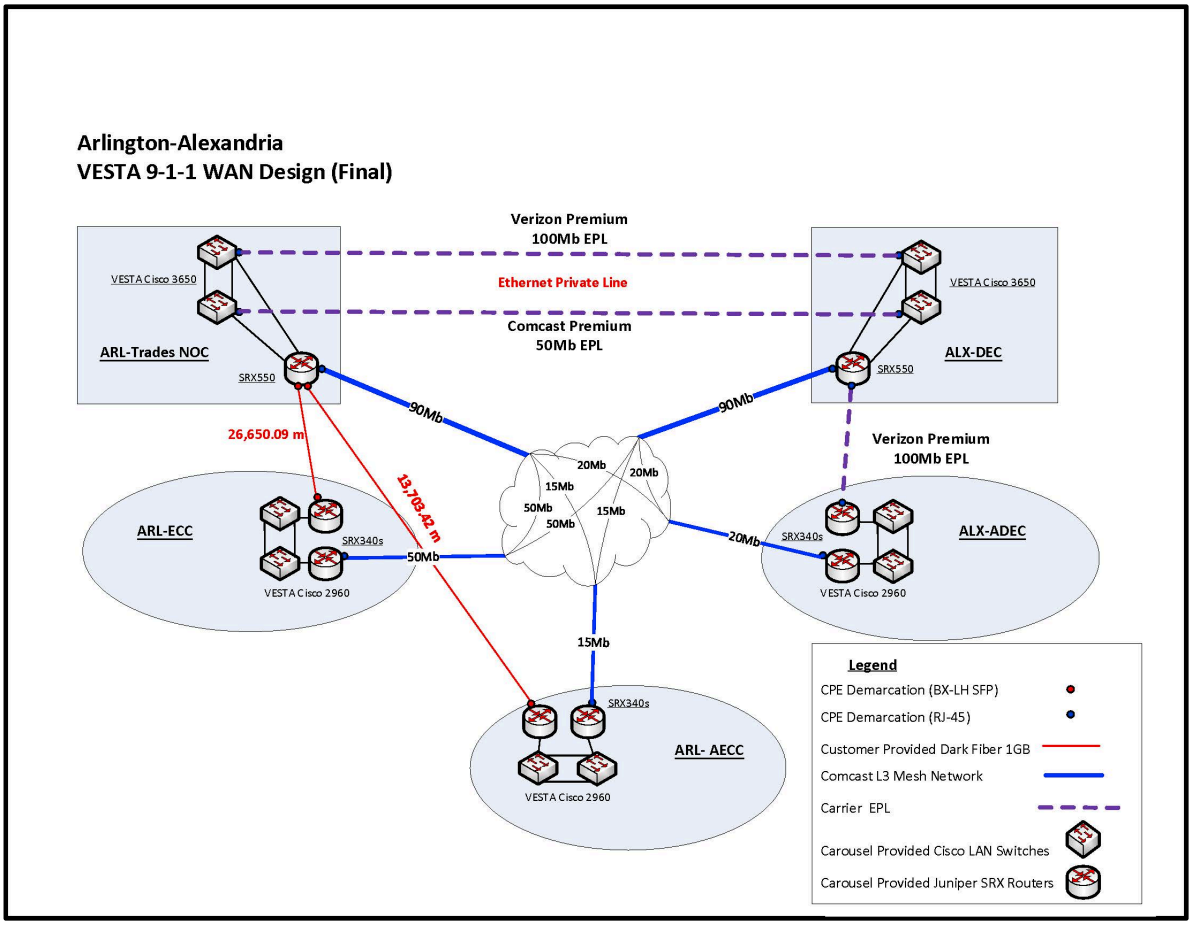

Figure 3 - Alexandria - Arlington Wide Area Network

Technology Cost Considerations

The technology solutions highlighted in this section have significant cost implications for any agency. Alexandria has been proactive in obtaining, and maintaining, state of the art capabilities. As a result, major modifications were not required to implement the remote call taking solution. However, as will be addressed later there were still adjustments and modifications required and there were costs incurred.

Staff conducted research on the costs of obtaining additional equipment, providing supporting equipment which included battery backup systems, Wi-Fi capabilities, deployment of virtual private network capabilities and the use of FirstNet devices. They factored in not only the cost of the equipment but also the ongoing maintenance, spare parts, and cost of replacement.

The importance of accounting for backup, failover, and contingency equipment and services cannot be overstated. Alexandria DECC had incorporated much of this planning into their existing COOP, but there was still additional work required and new considerations had to be made in short order to support the deployment of the entire solution.

Continuity of Operations and Disaster Recovery

The purpose of a Continuity of Operations Plan (COOP) for the ECC is to establish policy and offer guidance to preserve mission essential functions for the ECC in the event an emergency threatens or compromises operations, and it is necessary to relocate staff and functions of any essential facility.

Analysis:

It is highly recommended that stakeholders develop a COOP that is aligned with NFPA 1221, APCO ANS and FEMA.[3] Alexandria has developed an extensive COOP and accounts for all major elements as recommended by FEMA, NFPA 1221 and relative APCO ANS.

The primary center for Alexandria DECC is located in the Police Department Headquarters building. The backup center for Alexandria DECC is located in a geographically separated, fully redundant, secure site. Alexandria DECC has a state-of-the-art MCC7500 dispatch console with direct and redundant connectivity via fiber and/or microwave. They also use MCC 7500 consoles at the backup site. The backup site has access to the same shared talk groups as the main system.

Establishing a backup plan is vital to ensuring continuity of service and dispatch operations should the ECC suffer a catastrophic systems failure or need to evacuate the facility. Alexandria DECCs COOP includes the following essential elements:

- *Maintain a separate, "hot" backup* ECC that is identical to the primary ECC, but usually smaller, and can be used in an emergency or to expand the primary ECC's capabilities in major incidents.

The most current edition of APCO's ANS Emergency Communications Center Capability Rating Scale[4] establishes criteria for levels of service from an alternate facility (backup location) during a significant event that precludes the use of the primary facility. Alexandria DECC implements this rating scale by ensuring:

- **Standard Criterion:** The ECC can receive and handle voice calls from the alternate (backup) facility.

3 www.fema.gov/media-library-data/20130726-1511-20490-6446/bizindst.pdf
4 apcointl.org/standards/standards-to-download/

- **Advanced Criterion:** The alternate ECC provides the same level of service as the primary site but may do so at a diminished capacity. The alternate facility captures call and CAD data, and it is available to the primary site when it is back in service.
- **Superior Criterion:** The alternate ECC facility provides a comparable standard of service as the primary site.

The following excerpt from the Alexandria DECC COOP plan Executive Summary provides an excellent overview of what a COOP plan should contain, and how it is to be used:

COOP Planning

COOP planning is one component of the City of Alexandria's comprehensive emergency management program that addresses the preparation for, mitigation of, response to and recovery from disasters of all hazards. By focusing on efforts to continue the essential functions of the jurisdiction, COOP planning ensures that the government continues to operate—even in the wake of a major event.

It is important for all departments to understand that a COOP plan is not an evacuation plan, Emergency Operations Plan (EOP) or hazard mitigation plan.

A comprehensive COOP program allows each department to capture their day-to-day activities within a plan and to focus on those essential functions that will continue during and after the initial response to an emergency situation.

All-Hazards Approach

The City of Alexandria has adopted an all-hazards approach for all of its emergency planning efforts, including this one. Alexandria faces a variety of natural, technological, and human-caused hazards which pose significant threats to the citizens of the City. The threats that pose a significant threat to the City are listed in the City of Alexandria Emergency Operations Plan.

Purpose

The purpose of the *Department of Emergency & Customer Communications* COOP plan is to identify the following:

- Mission essential functions that absolutely must be maintained regardless of the challenges posed by an emergency or disaster situation.
- Determine the personnel, facilities, equipment, systems, information, and other resources necessary to support those essential functions; and
- Ensure the ability to maintain those essential functions with minimal disruption.

In addition, the COOP plan should:

- Address COOP activation management and orders of succession.
- Compile information to facilitate quick and effective communication and decision-making in a crisis; and
- Facilitate the recovery/resumption of normal operations (e.g., by identifying and safeguarding vital records and data).

The COOP also details procedures to implement actions to continue essential functions within the recovery time objectives established by the COOP Team to maintain essential functions for up to 30 days.

The Department of Emergency & Customer Communications is committed to the safety and protection of its employees, operations, and facilities. This plan provides the department and its personnel a framework that is designed to minimize potential impact during an event.

The Alexandria COOP has also implemented the use of "Drive Away Kits", as illustrated in the following excerpt from the plan:

Drive-Away Kits

Drive-Away Kits should contain operating procedures, emergency plans, operating regulations and other relevant guidance that is not pre-positioned at an alternate facility location. Other documents that might be included in Drive-Away Kit are:

- COOP plan.
- Departmental Policies and Procedure Documentation.
- Current contact list for personnel and external parties.
- CD-ROMs, memory sticks, or external hard-drives.
- General office supplies (small amount).
- In-processing packet.
- Cellular telephones, Blackberry, Nextel, hand-held radio.
- Current equipment report.
- Current software report; and
- Current vital records, filed, and database report.

Designated essential personnel should carry their Drive-Away Kit to the alternate facility.

A departmental go-kit will include copies of the department's COOP, call-down lists, and other vital records. The go-kit will also contain a laptop computer loaded with essential human resources and payroll information and department-specific software.

Copies of forms needed to continue providing essential services as well as forms that can be used to perform work manually should computer systems not be working properly will be included in the go-kit.

Essential personnel will also have a personal go-bag that includes personal care items. These items will include:

- A change of clothing
- Personal hygiene items (soap, shampoo, etc.)
- Drinking water
- Non-perishable food/snacks
- Eating utensils
- If applicable: Contact lenses and solution/extra pair of glasses
- If applicable: Prescription medicines
- Car adapter to charge cellular telephone

Some recommended items may be:

- Blanket
- Flashlight
- Batteries
- Portable AM/FM radio
- First aid kit/first aid items
- Extra batteries

Dispatchers:

- Headsets
- Portable Radios
- Response Plan (SOP 2.20 Fire Dispatch Procedures)
- Run Book (20th due)
- Map Books
- Manual Mode Cards

PD3/Telestaff

- FD Daily Briefing

Call Takers:

- Headsets
- EMD Cards (PowerPhone)

Teletype/VCIN:

- Teletype clip board
- Criminal Histories Log Book
- Administrative Message Log book
- VCIN/NCIC manuals
- Code manual
- “Cheat Sheet” Folder
- State/National Map Books
- Map

Supervisors:

- Police and Fire Call Out List
- DECC Call back list
- DECC Evacuation SOP
- On Duty Squad line up and Radio Sheet
- All Group Binders
- DECC Roster
- First Net Phones and Charges)

Administrative Staff:

- DECC COOP
- SOPs
- Vital Records

Alexandria DECCs COOP also accounts for establishment of essential personnel roles and responsibilities, trigger events, financial considerations (emergency budget authority), delegation of authority and succession planning. All of these are in compliance with, and many exceed, requirements per the sources cited initially.

ECCs should exercise their COOP on a regular basis. The DECC COOP accounts for this as follows:

Testing & Exercises

The testing and exercising of COOP capabilities are essential in demonstrating and improving the ability of the office to execute the COOP Plan. Tests and exercises

serve to validate or identify for subsequent correction, specific aspects of COOP Plans, policies, procedures, systems, and facilities. Periodic testing also helps ensure that equipment and procedures are maintained in a constant state of readiness.

COOP capability testing and exercising should include:

- ■ Periodic testing or alternate facilities, interoperable communications, and other capabilities
- ■ Exercising of COOP Plans and procedures annually to ensure the ability to perform essential functions under abnormal conditions, such as staffing shortages, operating from alternate facilities, etc.
- ■ Smaller-scale testing or various components of the COOP Plan
- ■ Testing of alerting and notification procedures and systems for any type of emergency
- ■ Supporting and participating in interagency exercises
- ■ Conducting joint exercises with *Department of Emergency & Customer Communications* counterparts in neighboring jurisdictions, as possible and appropriate

Consideration:

The Alexandria DECC has an extensive COOP plan that complies with national standards. It provides excellent reference points, as illustrated in the previous section.

Agencies can reference the Department of Homeland Security's (DHS) *Public Safety Communications Network Resiliency Self-Assessment Guidebook,*[5] which is a comprehensive guide for government and public safety entities. The guide:

- Offers instructions for assessing the resiliency of public safety communication networks.
- Describes common critical resiliency gaps in public safety communication networks.
- Proposes mitigating solutions for assured communications in stressed network environments.
- Demonstrates a proven methodology for data gathering, connectivity mapping, and analysis.

The Alexandria DECC COOP demonstrates compliance with all of the criteria overall. In addition, the COOP provides guidance for additional support requirements of as required.

5 dhs.gov/publication/communications-resiliency

Facilities

An ECC facility is unlike any other in a locality. There are distinct elements to the make-up of an ECC. For example, the physical work environment, actual working space, physical security, information technology and environmental factors (e.g., lighting, heating, ventilation, and air conditioning (HVAC), access control, etc.).[6] If all elements are effectively planned, equipped, or situated, and there is adequate space to support operations, then the ECC's ability to deliver quality service is enhanced. Alexandria's primary and backup centers take all of the elements into account and provide adequate to excellent facilities for the conduct of emergency call taking and dispatching functions.

Of particular interest in this study/report are the varied working conditions that remote personnel experience. As will be discussed in more detail in following sections, the remote call taker must still account for security, adequate bandwidth to support call taking services, including both 9-1-1 and CAD functions, backup power, contingency plans for potential "dropped calls", and working conditions where non-public safety personnel (e.g. – Family, roommates, etc.) may be present. While a modern ECC takes environmental, power, back up and security requirements into consideration, extending the functions of a traditional ECC into the home office or living spaces of ECC personnel presents unique challenges.

> ***Analysis:*** The workspace range for a position in an ECC is typically in the range between 150 and 200 square feet per position. Any facility, including staff homes, that will serve to support remote call taking, must contain adequate dedicated "office space".
>
> ***Consideration:*** Planning for requirements specific to the remote call taking role is necessary. Best practices suggest that to effectively house and protect ECC personnel and associated technology, appropriately hardened facilities are essential. However, in the case of remote call taking, much of what is traditionally considered a requirement, now becomes unavailable. Alternatives must be considered, planned for, deployed, and tested to ensure all essential requirements are met prior to actually operationalizing a remote solution.

6 NENA-INF-039.2-2018 (originally 56-506), July 17, 200. NENA Public Safety Answering Point Site Selection Criteria Information Document.

Section 3: Security Considerations

Physical Security

Protecting the mission critical operation of an ECC is paramount. As mentioned in the previous facilities section of this report, there are a number of standards and best practices that can be followed to address security measures in an ECC. While this section will discuss security in general, it is important to note that the majority of security requirements contained in this section will also apply to remote call takers and remotely deployed equipment and capabilities.

> ***Analysis:*** There is one public entrance into the Police complex and the entrance is controlled access and monitored by armed security. A metal detector is present and direct access is only available via the controlled entrance and lobby. There are other entrances for staff and/or secured prisoners when necessary. All doors are secured with proximity card access. The DECC access doors are secured via card access as well. There is a physical security policy that addresses key card approval process and issuance. Visitors are required to provide valid photo ID, process through the metal detector, and wear a "Visitor" badge while in the facility. Escort is required.
>
> ***Consideration:*** Physical security for the main DECC location appears to be excellent and far exceeds minimum requirements. Physical security for remote locations is very difficult to qualify and/or quantify. It is critical (for a number of compliance issues) that security be accounted for with any remote personnel who have agency issued equipment and software at their location. Proper tracking of the issued equipment, documented security requirements provided to personnel at time of issue, and ongoing tracking of assets as well as secure storage, both when in use and not in use, must be accounted for.

Cybersecurity

The National Initiative for Cybersecurity Careers and Studies (NICCS) defines cybersecurity as the activity or process, ability or capability, or state whereby information and communications systems, and the information contained therein, are protected from and/or defended against damage, unauthorized use or modification, or exploitation.[7] A paradigm shift in cybersecurity awareness must be instituted with technical and operational considerations to protect existing and next generation systems.[8]

Cybersecurity will continue to be a primary concern of all public safety operations. Denial of service attacks (DoS), phishing, malware, hacking and other malicious cyber activities will continue to be a concern, especially as Alexandria approaches NG9-1-1 deployment. "It is

7 NICCS. https://niccs.us-cert.gov/about-niccs/glossary
8 APCO Project 43. Broadband Implications for the PSAP. "Cybersecurity"

not if you are attacked, it is when you are attacked," is common when discussing cybersecurity in today's modern environment.

The review team's analysis follows a multilayered approach for cybersecurity. In organizations like the Alexandria DECC, the people, processes, and technology must all complement each other to create an effective shield from malicious cyberattacks. In addition to accounting for physical and cyber security on premise, it is no less important that the same considerations, and planning, be factored into a remote call taking scenario. Especially given the geographic diversity of a remote call taking team, and the varying levels of security present at each location, security becomes even more challenging in the remote environment.

***Analysis*:**

Formal programs for the training of PSTs on cybersecurity were not present. During site visits, the review team verified that there is a physical security policy that is adhered to.

The DECC has virus protection, and a specific cybersecurity policy related to all vendors. While there is not established cybersecurity training for PSTs at this time, the agency does have policies in place to identify cybersecurity as a concern and provide initial guidance to employees about network and device security. The agency distributes a weekly Cybersecurity Digest, provided by the NCR (National Capital Region) Threat Intelligence Center. In addition, the city is currently in the process of updating its version of the Cybersecurity Administrative Regulation. The city also currently sends out a quarterly cybersecurity awareness refresher with test regarding cybersecurity.

The Alexandria DECC still has some systems that reportedly operate on a Microsoft Windows 7 computer. DECC representatives indicated they are in the process of replacing computers running Microsoft Windows 7. This is especially critical because Microsoft Windows 7 has reached its operational end-of-life and will no longer be patched, supported, or secured by Microsoft. This introduces numerous cyber vulnerabilities across the entire enterprise.

The Alexandria DECC does not allow email and/or open internet access on CAD computers that are considered mission-critical system computers.

Cybersecurity for remote personnel presents a number of challenges. Network security, CJIS and State/Local security policy compliance, Information Security (INFOSEC), HIPAA compliance, and Operational Security (OPSEC) must all be taken into consideration and accounted for with remote personnel.

***Consideration*:**

Cybersecurity training should be conducted in accordance with APCO ANS Cybersecurity Training for Public Safety Personnel. According to this standard, cybersecurity training should be conducted at least annually for four to eight hours. However, the standard also states that, "As cyberattacks evolve and become more sophisticated, ECCs should consider providing some form of cybersecurity training more than once per year to provide employees with up-to-date information about current cybersecurity threats and to refresh employee commitment to cybersecurity hygiene."

ECCs need a framework that outlines how to deal with both attempted and successful cyberattacks. A myriad of industry standards and best practices are available to help ECCs develop their cybersecurity programs. ECCs should choose those that are either mandatory for compliance purposes or those that are right for them. At a minimum, such programs should address how to identify attacks, protect systems, detect, and respond to threats and recover from successful attacks.

In the case of Alexandria DECC, extension of these policies to remote deployed personnel is very important. It is equally important that the agency promote an atmosphere of information sharing and voluntary "breach" notification. This proactive approach to cybersecurity compliance allows the agency to be confident that any potential breaches, or attacks, are mitigated quickly and empowers employees to become part of the solution and not fear recrimination for reporting issues that can impact the larger organization.

The National Institute of Standards and Technology (NIST) Framework for Improving Critical Infrastructure Cybersecurity[9] can be used to create a new cybersecurity program or improve an existing program (Appendix C). An additional resource is the FCC Task Force on Optimal Public Safety Answering Point (PSAP) Architecture (TFOPA), [10] which contains recommendations that ECCs can take to optimize their security, operations, and funding as they migrate to NG9-1-1. The APCO cybersecurity webpage[11] is an excellent source for information on cybersecurity risks and mitigation. (See recommendation #28)

Ensuring that mission-critical equipment is protected, and agency personnel are adequately trained to recognize and mitigate cyber threats should be a top priority for the ECCs. The extended support for Windows 7 ended effective January 14,

9 Nvlpubs.nist.gov/nistpubs/CSWP/NIST.CSWP.04162018.pdf
10 Transition.fcc.gov/pshs/9-1-1/TFOPA/TFOPA_FINALReport_012916.pdf
11 www.apcointl.org/cybersecurity/

2020. As such, Windows 7 may still function, but will no longer provide the following:

- Technical support for any issue
- Software updates
- Security updates or fixes

Due to the loss of support, Windows 7 is at a greater risk for viruses and malware. It is recommended that the Alexandria DECC ECC move all systems to a Windows platform that is currently supported by Microsoft.

Section 4: Overview and Analysis of Call Taking and Dispatch Operations – Pandemic Response

Alexandria DECC, like every 9-1-1 Center and First Responder agency in the Nation, was forced to deal with a sudden, unanticipated, major event in the form of the COVID-19 pandemic. In addition to this worldwide catastrophic event, "normal" operations continued and in the case of Alexandria included not only everyday criminal activities and life safety events, but civil unrest, violent protests, and a Presidential inauguration.

Staffing and operational support requirements are already challenging for ECCs. With the potential loss of critical personnel due to illness, drastic changes were forced upon Alexandria. The inability to continue operations in the manner consistently followed for decades, as a result of the pandemic and necessary health and safety precautions, required a new way of thinking and adapting. Fortunately, the leadership team at the Alexandria DECC, working with their supervisory and line personnel, support services teams, and vendors, was able to craft a first in the nation response to this unprecedented event.

This section is dedicated to tying together all of the previous sections and illustrating how, and what, Alexandria DECC specifically did with regard to the creation, deployment, testing and implementation of remote call taking capabilities for both Emergency (9-1-1) and Non-Emergency (Admin and 3-1-1) calls. The deployment of Motorola VESTA "command post" equipment for 9-1-1, and additional CAD and radio equipment, paired with supporting technology that included FirstNet Wi-Fi capable devices, battery backup equipment, and security protocols and services, all came together to not only complete a proof-of-concept exercise, but then to actually operationalize that capability and go live. In addition to the deployment of this capability the implementation of Isolation Teams, the physical separation of personnel between two active centers, proactive deep cleaning of each center as shifts alternated and encouraging employees to actively participate in the solution were all factors that will be examined, and assessed, in this section.

Background

The first American case of COVID-19 was reported on January 20, 2020. Former President Donald Trump declared the U.S. outbreak a public health emergency on January 31, 2020. The disease was declared as pandemic by the World Health Organization on March 11th, 2020. This brief timeline of the pandemic is meant only to frame the activities undertaken by Alexandria DECC and put them in context from a timing perspective.

In early February of 2020 leadership at Alexandria DECC was already planning for the impact of the pandemic. Realizing that operations were going to be impacted, and understanding that impact would likely be long-term, not just a brief "quarantine" period, DECC began exploring options for dealing with the pandemic in the context of both health and safety for their personnel and as part of an integrated COOP plan

approach. To this end the agency began to explore the possibility of remote call taking for both administrative and 9-1-1 calls.

Due to the nature of the 9-1-1 system in Alexandria, the Wide Area Network (previously noted), and the fact that Alexandria has a modern, recently updated, IP capable system and had purchased a "Command Post" option. This option, when all elements are in place, allows the deployment of remote ECC capabilities. Originally designed as a deployable asset for major events or as a disaster response, and not originally designed for at home call taking, the scalability and flexibility of the system is notable. ACS does not endorse any specific vendor or product, and the comments related to the VESTA Command Post are not meant to convey an endorsement, merely to state the facts that the system was able to accommodate remote call taking at a basic level and based on this fact, Alexandria DECC began to design a remote call taking capability based on that system and its capabilities.

Initially, there were a number of issues. Security, both physical and cyber, was a concern. Since the system had to directly interface with the CAD and RMS systems, those connections had to be accounted for. Recording of calls was a critical consideration, and one that kept other centers from being able to successfully deploy a live 9-1-1 call taking capability. Connectivity from the home deployed call taker to the primary, or back up, center was critical as was the bandwidth, reliability, and security of any such connections. In addition, since Dispatch services were not originally deployed, but were a major factor in the construct of this solution, relaying information from call takers to dispatchers was of great importance. All of these factors had to be accounted for, and related issues solved. Not only was a design of the remote call taking capability needed, but also a plan to safely continue to staff the primary and backup centers, maintain required interfaces between those centers and remote deployed personnel, and manage personnel and equipment in potentially a dozen or more locations, had to be factored in.

Alexandria DECC approached this challenge in a systematic, logical, risk-management based way. As will be detailed in the remainder of this section, not only was the DECC able to address the issues they have provided a roadmap for others to design, and implement, similar services.

Isolation Teams and Shift Segregation - The First Steps

The first task at hand was the development of planning for maintenance of a safe, continuous, operational capability at the primary ECC and the backup ECC. Regardless of the success or failure of any remote capabilities, Alexandria DECC leadership knew that they would have to maintain operational capabilities with at least one, if not both, of the ECC locations.

Due to the architecture, connectivity, and hot stand-by nature of the Alexandria system, initial planning revolved around staffing, separation, cleaning, and rotation of personnel. The decision was made that each shift, as a group, would be completely segregated physically and by scheduling, from each other shift. For example, Shifts B and D were working in the primary center and would remain assigned to that center only for the duration of the implementation of the plan. Shifts A and C were assigned to the backup center. The shifts were split into every other day on duty, with a three-day weekend rolling option. Where shift B worked days at the primary center, shift D worked nights. If they worked a Monday shift at the primary ECC, then shifts A and C would work a Tuesday shift at the backup. This allowed for a thorough, deep cleaning of the primary center on Tuesday, prior to shifts B and D returning for their next scheduled day on Wednesday. Likewise, when shift A and C completed their Tuesday shift, the backup center could be deep cleaned on Wednesday, prior to the shifts returning for their Thursday rotation.

The intent of the separation of personnel by both schedule and location was intended to ensure that the maximum COVID 19 exposure the center could incur would be no more than 50% of the personnel, and in fact would likely be no more than one shift, or approximately 25% of the total staff. This scheduling plan was put into place as the first step in the overall response.

In addition to the staffing plan, Alexandria also looked for another level of insulation to assist in ensuring that exposure of staff to COVID-19 was minimized, and operations were protected. As a result, the Isolation Team concept was created.

The original Isolation Team effort took place at a local Hotel. Space was acquired that allowed personnel to work in an office like setting (conference/meeting rooms in the hotel) then return to their “home” in their hotel room. Unfortunately, for reasons including noise (both acoustics and background), power, and cost, this trial was only used for a few weeks. However, this allowed time for Alexandria leadership to begin initial testing of the remote call taking solution and to firm up the long-term plans for Isolation Team use at the primary center.

Isolation Teams actually lived, and worked, in the primary center 24 hours a day. Because Alexandria has excellent physical facilities, is located within the Police Department in a secure, fully monitored, and protected building and has sleeping, eating, and personal hygiene facilities (restrooms, showers, etc.) the extension of disaster planning to an Isolation Team concept was a natural progression. Isolation Teams would remain in the building, and completely isolated from outside exposure to COVID-19, for as long as necessary. Three isolation teams were established and rotated in/out of the center every 10 days. The initial isolation team remained in the center for fourteen days, but it was deemed more effective (primarily for the mental well-being of the teams) to reduce this to ten days for the subsequent teams. s.

Analysis

From a purely COOP perspective, the separation of shifts by location and time, and the Isolation Teams plans were highly successful. At the time of the initial onsite interviews in November of 2020, Alexandria had experienced NO cases of COVID-19 that impacted their center. However, on the last day of the onsite portion of this review, a single positive case was identified. Because of the segregation of crews, the availability of the Isolation Team option, and the deployment of remote call taking, Alexandria was able to respond quickly. They implemented needed safeguards, quarantined personnel as necessary, deployed the remote call taking option, activated Isolation Teams and suffered no significant impact to operations.

It would not be a complete picture without assessing the human element. While the pandemic has had a noticeable effect on society in general, it is no exaggeration to say that front line personnel from medical professionals to first responders, including 9-1-1 professionals, have been among the hardest hit. Like grocery store and food service personnel, first responders did not generally have the option to work from home. Their jobs required that they be on location at their worksites. Until the development, testing, and deployment of the remote call taking solution for 9-1-1 was complete, Alexandria implemented restrictive policies based on CDC guidance, and out of necessity, required their personnel to comply with those policies and to report to work at the physical center. Onsite policies included temperature checks, wearing masks, and maintaining distancing. While Alexandria did not regulate whether their personnel could take vacation, or travel, they did regulate what procedures had to be followed when an individual did so. Specifically, if an individual traveled outside of their normal home/work areas, they were required to self-quarantine and not return to work in the center for a pre-determined amount of time. If they were not experiencing any symptoms at the end of that time, they could return to their normally scheduled shift(s). Similarly, if any individual knew they had been exposed, or potentially exposed, to COVID, they were not to come to the center, and they were to follow

the CDC exposure guidelines. Alexandria DECC leadership clearly communicated expectations to their employees and wrote policy to account for requirements. At the same time, while a policy covers the legal aspects of such personal responsibilities, one of the most important aspects of this entire response, as reiterated via interviews with employees and leadership alike, was the establishment of trust. Both sides of the equation had to trust each other. One example of an effective way of establishing trust was the fact that the leadership team kept staff informed about any potential exposures while ensuring they followed all HIPAA guidelines. As with many public safety agencies, the Alexandria DECC considered themselves "family". To a person, the individuals interviewed as part of this study and report, all said they treated their co-workers with the same regard, trust, and care that they would treat any family member and everyone "looked out for each other". More than just "pie in the sky" sentimentality, this trust was illustrated in the success of the shift segregation and the Isolation Team. While initially the minimum amount of personnel required volunteered for the Isolation Team, it was not long before nearly every member of the Alexandria DECC staff made it clear that they were ready, and willing, to deploy to the center if and when needed and to be part of the next iteration of Isolation Team staff. In addition, there were no occurrences of any staff knowingly reporting to work after possible exposure, and even in the case of the positive test in November 2020, the personnel involved immediately notified the center leadership and self-quarantined. In fact, in what may be the most powerful testimony to the level of teamwork present, and to the success of this program, even individuals who were quarantined and entitled to leave with pay, volunteered to work from home once the remote call taking solution was deployed.

The initial success of the shift segregation and Isolation Team response was a precursor for the larger plan of implementing remote call taking. While these two phases of the larger response were being operationalized, planning was under way for the next step, testing and live deployment of that capability.

Remote Call Taking – Challenges and Opportunities

The evolution of 9-1-1 and the associated technology, coupled with a pandemic, combined to provide a unique set of challenges and opportunities. Alexandria DECC decided to investigate the concept of deploying personnel remotely, from home in this case, to take calls and support DECC operations.

The following list details the challenges faced by Alexandria in establishing a remote call taking capability:

- **Remote Login – 9-1-1 and CAD**

In order to implement the remote call taking plan, it was essential that personnel who were remotely deployed could log in to the 9-1-1 system. Equally important was the need for that system to seamlessly interface with the CAD system. The Command Post offering from Motorola provided the remote login capability. The Motorola solution literally became an ECC in a box, as illustrated in Figures 4 and 5.

Figure 4 - The Box

Figure 5 – The "ECC in a Box"

The pelican case container included the needed laptop, power supply and access equipment. Not pictured here, but shown in later illustrations, are the monitors and CAD laptops that also accompanied the solution. In order to connect the remote 9-1-1 call taker with the appropriate CAD terminal, Alexandria mapped each remote call station to a specific CAD workstation in the ECC. This meant literally taping off positions at the main site and reserving them for remote connectivity on a dedicated basis. The remote call taker, using a deployed laptop, would connect via Remote Desktop Protocol (RDP) to the appropriate CAD workstation in the ECC.

In addition to this physical identification, and reservation of each CAD and 9-1-1 workstation, and mapping to the appropriate remote call taker, to ensure the ANI/ALI information flowed correctly from the call taker station to the CAD station, the computer names had to be properly mapped to each other. The VESTA position taking remote calls, had to map to the CAD station and vice versa. Alexandria completed this mapping, and position identification as part of the initial

deployment and testing phase. They are currently building a simplified template to make future deployments quicker and easier.

There were a number of additional challenges to the initial design and deployment. The Criminal Justice Information Services (CJIS) establishes requirements around which the access of sensitive information, such as the records contained in the National Crime Information Center (NCIC), are governed. In Virginia, access to NCIC and other criminal justice services is obtained via connection with the Virginia Criminal Information Network (VCIN). This system, and access, is managed by the Virginia State Police (VSP). VSP had concerns about remote access and in their role as the gatekeepers of the program in Virginia, Alexandria needed to work with VSP to break down potential barriers, solve the issues, and satisfy VSP that CJIS requirements would be met. One way in which Alexandria successfully navigated these waters was to create virtual machines for the CAD system. As noted, while CAD and 9-1-1 had to map to each other, the use of a virtual machine, where the nomenclature was registered with, and approved by VSP kept traffic and data secure by ensuring that all traffic actually routed back to a secure terminal, located inside the ECC.

Alexandria had considered, and had initially included the use of, Mobile Data Computers (MDCs) as a potential solution. While VSP approved the use of MDCs, that approval was limited to personnel who lived in the State of Virginia, as the solution would be deployed to individual's homes. Because of the proximity of Alexandria to the District of Columbia and Maryland, there are a number of employees who do not live in Virginia. As a result, MDCs were not a viable option for the larger deployment.

The main issue with connectivity and CJIS compliance was not just the CAD system, but the network through which remote workers would access CJIS sensitive VCIN and NCIC information. While the MDCs used the State network, they were not an option for a wider deployment, so Alexandria developed the RDP approach, and virtual machines. All access at the VCIN and NCIC level was through the secure, approved, ECC facility. However, to ensure continued compliance, and to meet VSP requirements, the decision was made to limit the remote solution to call taking only. All VCIN/NCIC queries were performed by personnel located in the ECC.

As was noted by several of the individuals interviewed, this was an example of politics being one of the biggest challenges, and one of the hardest things to overcome. Fortunately, through a combination of diligence on the part of Alexandria, and a willingness to consider innovative solutions on the part of VSP, this issue was successfully mitigated. The result was a fully integrated working solution that was deployed as illustrated in Figures 6 and 7.

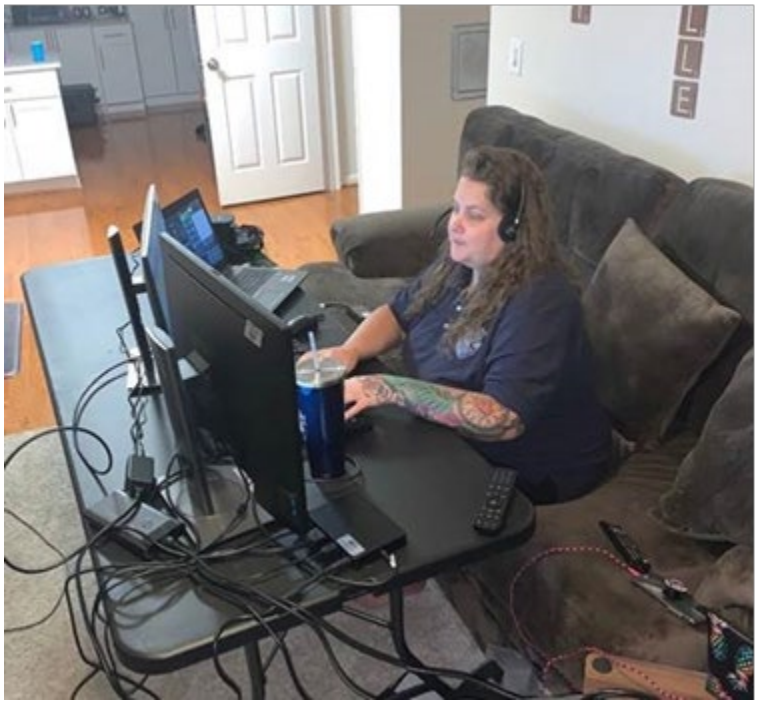

Figure 6 - Remote Call Taking (1)

Figure 7 -Remote Call Taking (2)

- **Remote Security**

Maintaining multiple separate physical locations is challenging on a number of fronts. As noted in the previous section, there are CJIS and VSP requirements to meet just to take and process a call. In addition, there are a number of security considerations that Alexandria had to account for internally.

Physical security is of concern with any 9-1-1 center. While Alexandria has excellent physical security practices in place, and two physically secure facilities available, extending aspects of physical security to an employee's home is challenging. First, the equipment involved is valued in excess of $80,000. Not only does the equipment have to be transported to the employee's residence, set up, and maintained, but it must be secured from theft, unapproved access, and damage. Additionally, access can occur inadvertently with employees working from home and family, roommates or other individuals potentially coming and going while the employee is "at work".

In order to account for physical security, a combination approach was adopted. Policies and procedures were put in place to extend access control to sensitive information to the employee's homes. Employees were advised of, and proactively engaged in, physical security policies governing unwanted, or unauthorized, access to information. Whether that meant working in a room completely separate from others in the home or facing the screens in a direction that would not allow inadvertent "walk by" access, each employee was advised to set up their remote workspace accordingly. As with any ECC, if persons were present who were not authorized to view sensitive information, that information was to be "closed" on the screens until that unauthorized person was no longer in the area. Personnel who were chosen to take calls remotely were also advised that the physical equipment became their responsibility, within reason, upon deployment. Equipment was to be logged off, and completely shut down, when the employees were off duty. It was also to be kept in a locked residence unless being transported to or from the ECC or another remote deployed location.

With the physical security of the equipment, and the data it processes, accounted for as best as possible, protection of agency information, caller information, and the networks themselves became the next critical component of the design and implementation.

As noted in the FCC Task Force on Optimal PSAP Architecture report:
"Cybersecurity is a very real threat to public safety in general and to Public Safety Answering Points (PSAPs) specifically. Given the very nature of a PSAP as the interconnect point from the public to first responders, and the increasingly technical nature of the operations at PSAPs around the nation, it has become more

critical than ever that adequate planning, strategies, and systems be put in place to defend PSAPs against potential cyber-attacks. Current analog systems have already been compromised by "simple" cyber-attacks such as Telephony Denial of Service (TDoS) and Radio Frequency (RF) jamming. The next generation of 9-1-1, a fully digital, IP based, multi-media capable network of networks, will open the doors to multiple attack methods and vectors that PSAPs have never had to plan for, or deal with."[12]

In addition to the traditional public safety concerns, and the specific concerns with CJIS already noted, the fact that a remote call taking solution basically becomes similar to a small "Internet of Things" for public safety, via the remote call takers and capabilities, adds another layer of complexity. As illustrated in figure 6, courtesy of a threat assessment report from Ericcson, end-to-end security from remote call takers, via access networks, to the ECC (primary or backup) and on through to criminal justice and related systems, is a complex web to weave.

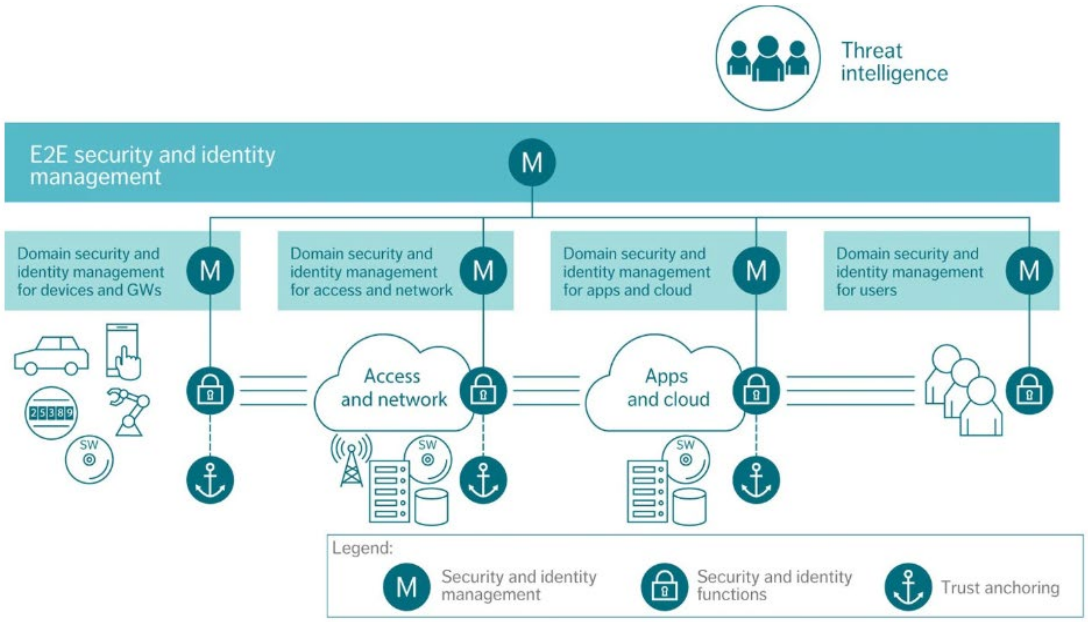

Figure 8 - End to End Security[13]

In order to account for multiple layers of security requirements, properly protect the networks and information involved, and ensure the best possible threat mitigation from cyber threats, Alexandria had to implement a multi-faceted strategy.

[12] https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_FINALReport_012916.pdf
[13] https://www.ericsson.com/en/reports-and-papers/ericsson-technology-review/articles/end-to-end-security-management-for-the-iot

The Motorola VESTA solution utilizes Fortinet for their security solution. Fortinet is an American Cybersecurity company, headquartered in Sunnyvale, California. They have a large portfolio of clients, and services, and claim to have "more than 500,000 customers".[14] As previously stated, ACS does not endorse individual companies or solutions. That said, Fortinet has a solid reputation in the cybersecurity space, and is a reputable provider of cybersecurity, threat intelligence, and secure network access solutions.

With the 9-1-1 embedded security solution in place, and secure interface issues between CAD and 9-1-1 already accounted for, the biggest remaining security challenge was broadband connectivity from the remote call taker to the centers and associated on premise equipment and services. Bandwidth and connectivity requirements are the subject of the next sub-section.

- **Bandwidth and Connectivity Requirements**

Secure, consistent, adequate bandwidth was required for a successful deployment. Broadband connectivity is a must and reliable, secure connections had to be identified, tested, and proven.

Initially, Alexandria deployed the solutions using Mi-Fi devices provided by AT&T. Identifying from the onset the fact that commercially available, private broadband services such as Cable and Phone (DSL) based services were not sufficiently secure or adequately isolated from internet-based security risks, the Mi-Fi option became the initial test plan. While Mi-Fi offered better security, and more flexibility, than employees home networks, it still lacked the public safety grade security, redundancy, resiliency, and priority of dedicated public safety systems.

This is where FirstNet became a consideration. "FirstNet is an independent authority within the U.S. Department of Commerce. Authorized by Congress in 2012, its mission is to develop, build and operate the nationwide, broadband network that equips first responders to save lives and protect U.S. communities.[15]

More specifically, according to the FirstNet official website:

"FirstNet is a nationwide wireless broadband network for first responders being built and deployed through a first of its kind public-private partnership between the federal government and AT&T. FirstNet offers public safety a communications network built and customized to meet their needs.

The First Responder Network Authority is the federal entity charged with overseeing the creation and delivery of the FirstNet network. Housed within the Department of Commerce, National Telecommunications and Information Administration, the agency's role is to ensure AT&T delivers on the terms of its

[14] https://www.fortinet.com/corporate/about-us/about-us
[15] https://firstnet.gov/about

contract and creates a network that meets the needs of public safety now and into the future."[16]

Since Alexandria is already a FirstNet customer and subscriber, DECC leadership made inquiries to the FirstNet team and was quickly provided with a new, more secure, option for connectivity on a network designed and operated specifically for public safety. From an article done by FirstNet, in collaboration with the Alexandria DECC team, the following information provides an excellent summary of why, and how, FirstNet became part of the Alexandria DECC solution.

"The word is out about what we're doing, and the phone rang several times yesterday with people around the country asking how we did it," said **Bob Bloom, the Public Safety Systems Administrator.** "This has never been done before. Prior to 9-1-1, dispatching in the old days started in people's homes and citizens would volunteer to answer calls for help. Then, they'd have to sound the alarm. They then called a number which also rang in the homes of certain fire officers. We're full circle now with putting dispatchers back in their homes."

Under this innovative approach, Alexandria's remote dispatchers are using equipment that includes a laptop, headset and smartphone, FirstNet hotspot, mobile router with computer aided dispatch, and other necessary hardware. The hotspot with its FirstNet connection is critical to the operation, said **Renee Gordon, Director of Department of Emergency & Customer Communications** (DECC).

"We didn't want to rely on people's home internet because we know they can lose connectivity," said Gordon. "We know we won't lose connectivity with FirstNet." Bloom agreed: "So if all hell breaks loose, we're not going to lose connectivity to our home center. I sleep a little better with FirstNet."

DECC Director Gordon said there were some concerns about the unknowns of remote call-taking, but the COVID-19 crisis spurred them into action. "We started planning and testing in January. We've had this equipment but never used it, and it's been in the back of our minds that we need to explore this technology," she said. "We did a lot of testing. Probably why others aren't using it is because it's scary. What happens if the call drops?"

The DECC implanted planning and testing to this approach in three distinct phases, and the remote capability went live on March 6. For the first month, the remote workers answered non-emergency phone calls only until they decided the system was working so that 9-1-1 calls could be handled as well.

The dispatcher at home accesses the department's CAD system remotely via a connection to a laptop set up at their normal dispatching position back at the 911

[16] https://firstnet.gov/about/history

center. The dispatchers remotely have the full functionality of the center at their fingertips. “It’s the same as what they have in the center, just a shrunken down version,” said Bloom. “They have RapidSOS, Smart911 and all the buttons at their fingertips. We put a talk group for 311 and 911 on the phones so it’s like being back in the center where you can share information.”[17]

FirstNet is operational and providing responders with a wide array of solutions and options, all designed for and dedicated to, public safety. As noted in the APCO Project 43 report, security is a key component of the FirstNet solution, and in the case of Alexandria offered a 9-1-1 center a viable, immediately available, and public safety grade solution to meet their broadband connectivity requirements as illustrated in Figure 9.

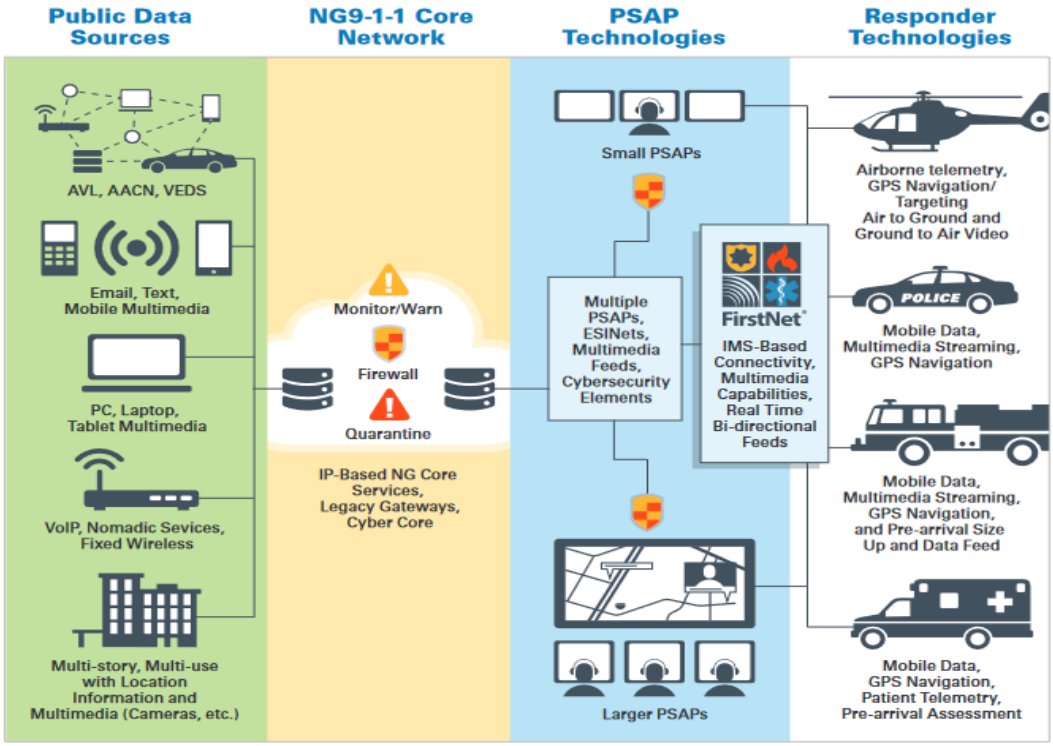

Figure 9 - Interconnected NG9-1-1 and FirstNet[18]

- **Backup Systems**

Backup systems are required for any ECC operation. As most in the profession are aware, backup communication paths, spare equipment, and backup procedures for power outages, system failures, and communications failures must all be addressed. Unique to this deployment, those backup procedures had to be

[17] https://firstnet.gov/newsroom/blog/city-alexandria-va-utilizes-firstnet-911-remote-call-taking-during-pandemic

[18] https://www.apcointl.org/resources/broadband-implications-for-the-psap/

extended to multiple remote locations, in facilities not owned, maintained, or regulated by Alexandria DECC.

To address these issues the DECC came up with the following standard procedures:

- Uninterruptable Power Supplies (UPSs) were purchased and deployed with each kit/user.
- FirstNet Mi-Fi devices were purchased and deployed with each kit/user.
- Spare kits and parts were maintained at the primary ECC for deployment in the event of failure.
- A remote diagnostic capability was established for direct IT support of all remote users.
- The remote diagnostics included the ability to remote login and "control" the equipment in the remote location.
- If remote diagnostics could not solve the issue, the equipment would be picked up and swapped for spare equipment.
- Backup for all recordings is required. The current architecture records at both the server level (on premise at ECC) and local (laptop) level, meeting this requirement.
- Alexandria DECC utilized Microsoft Teams for remote meetings, and remote access.
- In the event the FirstNet device lost connectivity, which did occur during this deployment, the call taker was advised to reboot the device and reconnect. Because of the call fail over procedure this was a successful procedure
- In the event the workstation failed or stopped responding, which also happened during this deployment, the call taker was advised to reboot the equipment.

The backup equipment, policies, and procedures enabled Alexandria, and their remote call takers, to deploy with confidence and to work the solution in real time, with remote diagnostic capabilities and spare equipment as required.

- **Call Failure / Dropped Call protocol**

The Alexandria DECC had to establish protocols for dropped calls. Just as occurs in any working ECC, remote call takers were going to experience dropped calls. The primary reason for these during the initial deployment was connectivity failure. The Mi-Fi connection for FirstNet is wireless and it is subject to the same issues as any other wireless connection. The devices lost signal or experienced other connectivity issues and had to be reset. As discussed above, there were

procedures in place to address this. Key among those was a clear directive that in the event of a connection failure, the call takers were NOT to connect via their home networks. There were to reboot and re-establish connectivity via the secure, approved, FirstNet devices. Interviews revealed that personnel were well aware of the policy and procedures regarding this occurrence. Some call takers admitted to violating the procedure in the early stages of deployment, but that as they became more comfortable with the operation of remote call taking, and with the equipment they were using, violation of this policy quickly diminished. It is important to note that personnel were open and honest about this variance from policy and stated they learned from their mistakes and did not repeat them. Fostering an environment of open communication was one of the most important, and effective, methods used to implement this solution.

Fortunately, the Motorola (9-1-1) and Central Square (CAD) systems have methods in place, designed into their solutions, to account for dropped calls. Since the Alexandria deployment was emulating a full workstation (both 9-1-1 and CAD) and using Command Post equipment directly interfacing with the call taking transport layer, and virtual machines remotely connected to physical machines in the ECC, the same dropped call capabilities present on premise were present at the remote locations. Should a call drop before the caller disconnected, the call would immediately return to the live queue for answer by the next available call taker. The call data would transmit to the new call taker (ANI/ALI, etc.) and the caller would receive the assistance required.

- **Internal Communication**

One of the most common issues identified in interviews was, “I can’t just yell across the room at my dispatcher or speak directly to my supervisor or fellow employees”. Surprisingly, this was the single element that was identified by every call taker, supervisor and manager interviewed. The inability to interact directly with other staff and to communicate in real time, in person, was a negative factor to everyone interviewed. While none of those interviewed stated this would cause them any concern about deploying the solution again, they did urge leadership to continue to look for ways to allow personnel to communicate directly. There were a number of situations which required use of cell phones including contacting the center if there was an outage or disconnect, contacting IT support, and speaking with supervisory personnel. There are chat capabilities available via CAD, and they were used extensively, but all personnel expressed the need to communicate more directly, and more quickly, as one of the few negative factors to this deployment.

Alexandria leadership realized this gap and instituted the use of Microsoft Teams for weekly shift and leadership meetings and for routine communications. In fact, the interviews with Alexandria personnel for this report were all conducted using Teams, to ensure the health and welfare of the Alexandria DECC employees and to

minimize impact to operations. DECC leadership continues to explore options and alternatives to chat but does not see this as a roadblock to future deployments.

- **Budget Considerations**

There are both positives and negatives to be considered here. On one hand, remote call takers can provide a supplemental force for not only COVID response but potentially major events or "surges". However, there is a cost associated with that capability. Overtime expenditures increased during both Isolation Teams and remote call taking deployments. Personnel must be onsite for supervisory, dispatch, and management functions as well as support. The flip side of this is that even if a person has to quarantine due to exposure to, or recovery from COVID they could work remotely reducing the amount of overtime required.

Not only were additional remote call taking kits purchased, but MiFi devices, UPSs, spare parts, and the time to deploy, set up, and test the equipment cost significant dollars. Alexandria was able to use some funds from the CARES act to fund part of the cost, but they needed support from local government leaders, and approval of additional funds on an emergency basis, to make this a reality. Fortunately, Alexandria had such support as local government leaders were engaged in supporting the solutions and provided the needed mechanisms to pay the additional costs.

It is important to note that Alexandria DECC accounts for the majority of their additional tasking (administrative calls, RMS input, etc.) by maintaining sufficient staffing. During remote operations, rather than being short-staffed due to pandemic considerations, the agency was able to maintain adequate staffing and continued to ensure timely processing of calls.

In the long term, it is likely that this solution will bear positive budgetary results now that the solution has been proven and is considered not only viable, but a positive, tool.

- **Personnel Travel Restrictions / Requirements**

The following statement from DECC leadership sums up this policy: "We don't tell people where they can go, but we do have requirements for when they return." Specifically, if an individual traveled outside of their normal home/work areas, they were required to self-quarantine and not return to work in the center for a pre-determined amount of time. If they were not experiencing any symptoms at the end of that time, they could return to their normally scheduled shift(s).

Similarly, if any individual knew they had been exposed, or potentially exposed, to COVID, they were not to come to the center, and they were to follow the CDC exposure guidelines. Alexandria leadership clearly communicated expectations to their employees and wrote policy to account for requirements. At the same time, while a policy covers the legal aspects of such personal responsibilities, one of the

most important aspects of this entire response, as reiterated via interviews with employees and leadership alike, was the establishment of trust.

- **Buy-In from Staff, City, and Customer Agencies**

This was identified as one of the most important aspects of the entire project. Buy in must occur at all levels from the most senior members of elected leadership and local government to the most junior call taker on staff. Through interviews with various levels of staff, the ACS team established that this buy in was not an easy task, but it was ultimately successful. As will be noted later in the report, interviews revealed that personnel all had some concerns, and some were even quick to say, "no way this is going to work" Fortunately, even those individuals who initially had doubts all become engaged in deploying, testing, and proving this solution. Of primary importance was the ability, and willingness, of leadership to listen to these concerns, openly communicate plans, work with employees to find solutions, and implement solutions that made sense. Without buy in from every level, this project would have failed. Alexandria DECC leadership, staff, and supporting levels of government all worked together to build consensus and implement the solution in a way that made sense for their agency, and their needs.

- **Vendor Assistance and Relationships**

The importance of IT support teams (including the third-party vendor Carousel who was instrumental in the success of the project) cannot be overstated. The initial 9-1-1 call taking capabilities were confirmed via Motorola and working in conjunction with the vendor and IT, initial deployment of the 9-1-1 portion of the kits was actually relatively easy compared to other aspects of the solution. Fortunately, Motorola proved willing to work with Alexandria and the CAD vendor (Central Square) to ensure seamless flow of information between the two systems. The bulk of the issues related to CAD revolved around the creation of RDP capabilities and creation of virtual machines. As noted, this required a substantial amount of planning and work on the part of IT staff, but ultimately proved successful.

What was likely the largest potential roadblock to a full deployment of this solution was the ability to record conversations, which was an absolute requirement. From a legal, quality control, and management perspective, not being able to ensure accurate, fully integrated, and backed-up recordings would have been a non-starter. Fortunately for Alexandria their voice logging vendor, Eventide, was willing to be a partner in the solution. Led by Eric Parker, the Alexandria team worked with Eventide to discover what was precluding the central server recording capabilities, and how to overcome those obstacles. Because Eventide was willing to allow Alexandria to make adjustments to their system, DECC was able to implement recording both remotely (laptop level) and centrally (server side in ECC). This enabled the live deployment to move forward.

Analysis

Overall, Alexandria DECC addressed each of the challenges they faced, worked collaboratively with staff, local government leadership, elected leadership, and vendors to create a workable solution. Through numerous iterations of testing, continuous adjustments and improvements based on that testing, and a logical, methodical implementation process, the agency proved that the concept would work, then successfully operationalized the solution. The agency also established a Standard Operating Procedure for the deployment and use of the remote call taking capabilities. They have agreed to make this document available to other agencies, and it is included in this report at Appendix A.

There were some negatives that were voiced by staff, most of which revolved around personal communications (face to face) and maintenance of situational awareness. While not all of these issues have yet been overcome, Alexandria continues to examine options and work to implement new solutions.

Additional support outside of the shared resources with the city administration and the police department (e.g., management/supervision, human resources, information technology) was an important component to the success of this deployment. Buy in from all levels was an absolute requirement.

Backup systems, policies and procedures, and obtaining and maintaining the required spare equipment is a necessity. Accounting for what is normally covered by being located on premise (UPS', spare headsets, monitors, etc.) must be extended to the remote locations. Tracking of parts, by those they are assigned to and by location assigned, is also highly recommended. This was consistently mentioned as a challenge during interviews.

A working solution for dropped calls is a must. Any deployed remote call taking solution must allow for a real time path for any dropped calls to be placed back in the queue and answered immediately by the next available call taker.

The budgetary impact of any potential solution must be considered. Initially there will likely be an increased cost. Planning and support must be in place to account for that cost. In the long term, there are potential cost benefits in reduced overtime utilization and surge support capabilities, but there will be increased cost at the onset, and this cannot be overlooked.

Establishing and maintain a partner like relationship with vendors is very important. Vendors must be willing to be flexible and provide innovative assistance. Without this type of relationship, the project will likely fall short as others have experienced.

The human element cannot be underestimated. Not only are policies and procedures required that cover personnel issues like travel and quarantine, but the establishment of trust on both sides of the equation is needed. Alexandria was fortunate that they did not experience many issues of personnel claiming to be "working" remotely, but not answering calls, taking extended breaks, or claiming equipment failure. All of these were real concerns voiced by supervisors and senior leadership alike. Interestingly, these concerns were also voiced by most of the call takers that were interviewed. Everyone who was willing to work remotely wanted to ensure that any of their peers doing the same was "keeping up" and "pulling their weight". This "self-regulating" approach proved successful in Alexandria but would need to be modified based on each individual agency needs and capabilities.

During each of the interviews, the ACS team asked Alexandria personnel to provide their "best and worst" list. While much of that information has already been incorporated into this report, in the interest of properly and accurately representing the human element, and reporting on all of the data discovered, not just positive but neutral and even a few negative comments, below is a condensed list (duplicate comments removed) of the best and worst from the personnel who actually took the remote calls and worked on the isolation teams.

BEST:

"The best part about this whole thing, was our Team."

- This kept us safe. And, even if we got exposed, or sick and were recovering, we could keep working and be part of the team.
- Immediately utilizing the backup facility and dividing the workforce was a good idea.
- Continuity of Operations was ensured and successful.
- As a staffing supplement this solution proved its worth both now and, in the future,
- We proved we could do this, and we were the first.
- Not having to spend time on a commute.
- Isolation Teams were a great team building exercise.

WORST:

What's next?

- Politics
- We all lost a lot of sleep over how to challenge industry, and ourselves, to make this happen. We had one chance to get it right, and it had to work.
- There were no guidelines to follow, no one else had ever done this.
- Communication issues. We can't just "yell across the room" to get information out to dispatchers and supervisors.
- We can't do supervisory duties remotely.
- Remote support is challenging. It is more difficult to diagnose issues and solve them.
- Does this tax power systems, and add costs, for remote employees?
- No ability to dispatch from home.
- This started off "kind of chaotic", but it quickly smoothed out and now it is very effective.

Remote Dispatch Options

While call taking capabilities were successfully addressed, the ability to dispatch responder units, via radio console and affiliated infrastructure, presented a different set of challenges. While remote 9-1-1 call taking became a proven capability and the technical, operational, and logistical challenges were overcome, the same did not hold true for remote dispatch.

The following list details the issues faced regarding remote dispatch:

- **Dispatch Services**

Alexandria DECC did not implement remote dispatch for a number of reasons. Primary among these was a licensing issue, limited range, antenna requirements, power requirements, and security issues, were all factors that weighed against the deployment of handheld or mobile radio equipment.

Additional issues included the fact that dispatchers routinely use VCIN/NCIC services. As noted earlier in the report, VCIN/NCIC access was limited to ECC onsite personnel for this deployment. Supervisors were also precluded from working remotely (in a supervisory capacity) which would further complicate performing dispatch duties from remote locations.

- **Licensing Issues (Out of Area / State Personnel)**

Transmission via portable radio, outside the license radius, was not an option. Not only were there coverage issues, but the license restrictions, put in place for good reason, made using mobile or portable radios impractical for this particular application.

As noted earlier in this report, DECC has a number of personnel who reside outside of the radius of the transmitter's licenses, and some who live out of State. Since the transmitters are located, and licensed, in specific areas with a defined, allowable radius for transmission of signal, allowing remote uses to utilize handheld, or mobile, radios outside of that licensed area was not an option.

- **Backup Systems**

As with the 9-1-1 and CAD systems, backup equipment would need to be available, and quickly deployable, for mobile radio solutions. Accounting for recharging of equipment, proper maintenance, security, and operability were also factors. It was determined that until a remote console capability becomes available, remote dispatch was not a viable, or advisable, option.

- **Internal Communication**

As noted, several times in this report, one of the most common issues identified in interviews was, "I can't just yell across the room at my dispatcher or speak directly to my supervisor or fellow employees". This factor figured prominently in the

decision not to deploy dispatch services to remote locations. With supervisors present only in the ECC, VCIN and NCIC queries only being done in the ECC, and call takers deployed remotely, the internal communication challenges between these three layers of emergency communications services must be addressed before successful deployment of dispatchers can be considered.

Analysis

What does the future hold for remote dispatch?

- The licensing issue can be overcome. However, this will require the installation and implementation of the Motorola MCC7500 E console. According to the Motorola website on this product:
  "The MCC 7500E IP Dispatch Console provides a full console interface experience anywhere inside or outside of your radio network. It can operate as a permanent, back up or mobile solution, with full console functionality. Whether for a planned event or immediate emergency response, command a wealth of information for high-impact results. Connect to responders with voice, Talkgroup Text Message and tone communication on ASTRO® 25 trunked and conventional systems."[19]

  Based on initial conversations with the vendor, and other agencies, Alexandria believes this console solution (an upgrade to their existing Motorola MCC 7500) would be able to overcome licensing issues, as all transmissions would be accomplished via the core system and contained within licensing parameters.

  To this end, DECC now has two fully operational MCC-7500e consoles, shown in Figure 10 and 11.

[19] https://www.motorolasolutions.com/en_us/products/dispatch/dispatch-consoles/mcc-7500e-ip-dispatch-console.html#taboverview

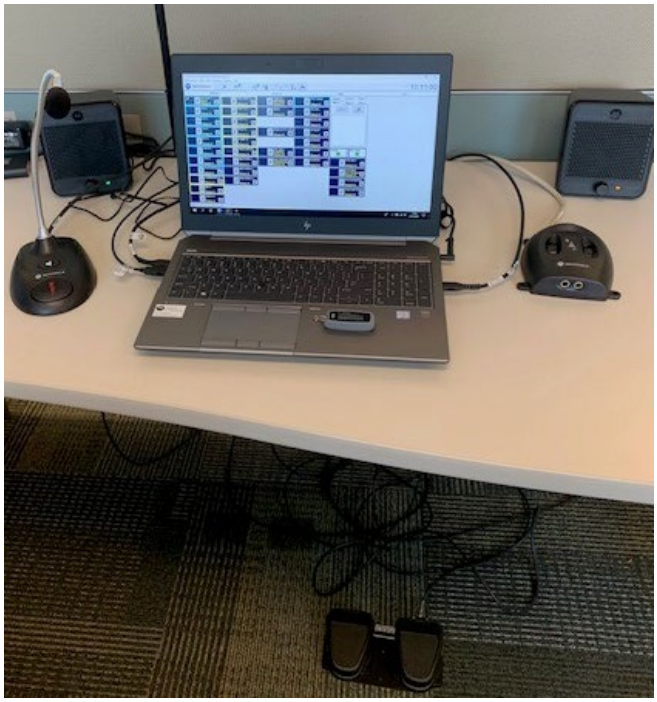

Figure 10 - MCC-7500e

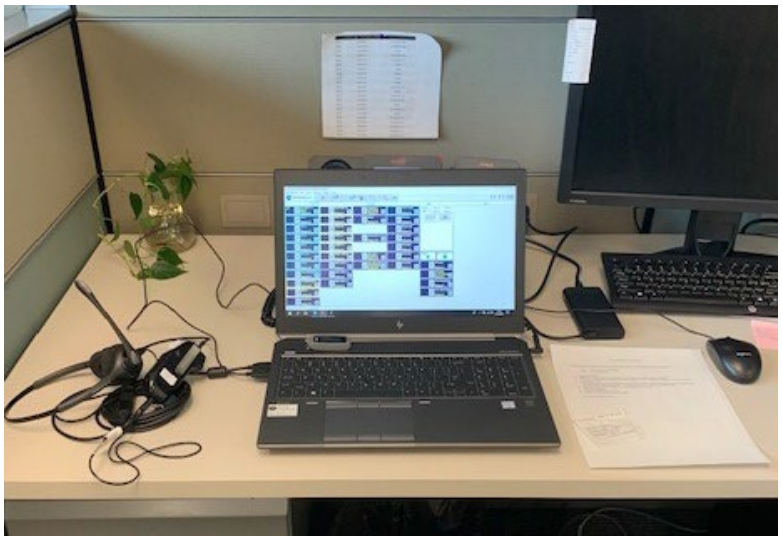

Figure 11 - Alexandria DECC MCC-7500e

- Functional considerations remain a concern. The ability to "yell across the room", presence of supervisors in the same vicinity as the dispatcher, and overall situational awareness must still be accounted for.

- Full support is not necessarily present for the radio console and any outage or issue with the software or hardware related to the console would require diagnostic and repair support. The logistics of this still need to be worked out.

Section 5: Recommendations and Best Practices

Alexandria DECC had to consider multiple options, account for a number of issues, architect a multi-layered technical, operational, and logistical solution, and encountered a lot of moving parts. This process was neither easy, nor intuitive. As was evidenced by multiple interviews conducted with DECC personnel, at all levels, one of the biggest challenges to this entire approach was that it had never been done before.

When Alexandria originally contracted ACS to do this report, the initial statement made by senior leadership at the DECC was, "we want this to be something others can use to build their own solution. We know what it is like to do this from the ground up, with no one there to answer questions or give advice. If there is anything we can do to help other agencies, we want this report to be that kind of tool." In keeping with that stated desire, Section 4 provided a technical and operational roadmap for implementing this type of solution. The following section provides a process roadmap that walks other agencies interested in developing their own solution through the necessary steps based on the successful deployment achieved in Alexandria.

Building the Project – Steps to Success

- **Identification of an Effective Champion**
    - Identifying a well-respected champion to lead and spearhead the process from beginning to end is a common key to success in most projects. This person should be well respected by leadership in all participating agencies as well as ECC employees. This person should also have or be able to easily gain knowledge of the ECCs, including operations, technology, budget and needs, as well as be able to manage a complex project.
- **Interest Building**
    - With directional support and involvement from the champion, develop interest in implementing the solution among decision-makers and stakeholders. Sharing of information and frank discussion should occur between the leadership and decision-makers of all ECCs. Relevant information as well as notice of opportunities to participate in decision making regarding operations and other areas, where possible, should be provided to ECC employees and responders. This will allow the employees to build ownership in the project as well as provide input where their knowledge is most needed.
- **Governance Structure**
    - A governance structure for the implementation of the project must be established. Likewise, governance for the operational solution must be

documented, and communicated to all stakeholders including internal personnel and external customers (agencies).

- **Establish a Mission Statement and Objectives**
    - While it is not an absolute requirement, development of a mission statement, objectives, goals, and rules can be helpful in guiding the process. This exercise would provide the agency with a foundation to establish policies and procedures. When establishing goals, the agency should consider using the "SMART" format: specific, measurable, attainable, relevant, and time bound.

- **Finance:**
    - Finance must be taken into consideration as the agency will be using public funds. Being able to demonstrate to citizens that funds are utilized in the most economically efficient manner while meeting the operational needs of the ECC is an important component. In addition, being able to demonstrate internally that any initial increase in budgetary requirements might well be offset in the long term by potential savings using this solution.

- **Procurement:**
    - Will be engaged to assist with purchasing items and ensuring compliance with and grant requirements (in this case CARES dollars were obtained). This will also ensure that any audits conducted by funding organizations are compliant. Procurement would also handle bids, Requests for Information (RFI), Requests for Qualifications (RFQ), etc.

- **Feasibility Assessment**
    - A feasibility assessment could include the following focus areas:

    - Benchmark current 9-1-1 and dispatch services by examining a wide variety of issues:
        - Staffing
        - Call processing.
        - Dispatching
        - Budget
        - Technology
        - Political environment
        - Facilities
    - Determine if remote call taking deployment makes sense from a service level, political, technological, and financial perspective.
    - Makes recommendations accordingly.

- **Planning Phase**

- Decisions must be made regarding participation, funding formulas, organizational structure, operations (training, procedures, policies, workflows), human resources issues, facilities, and technology needs.
- This planning process can be organized and facilitated by the champion and will require agency leaders to commit to regular discussions until all decisions are finalized.
- It is easy to add new equipment and services without reviewing all aspects of the solution. Ask employees for ideas about how to reduce complexity and make the solution more efficient. Questions should include, but are not limited to:
- How should we set up the remote work environment?
- Who is going to deploy the equipment?
- How much space is enough?
- Where are we going to keep spare equipment, and how many spares do we need?
- How will we track the deployment of the equipment?
- What are the physical and cyber security requirements in the deployed location?

Implementing the Project

- **Operations Planning:**
  - An operations committee consisting of command staff tasked with developing the concept of operations plan for a remote call taking capability should include development of operational procedures and establishing technology needs. Other duties may include handling personnel concerns, finance duties and other administrative tasks.
- **Technical Planning:**
  - A technical advisory committee would consist of technical staff with expertise in 9-1-1 systems, CAD, radio, RMS, and any other technical need as identified. The technical advisory committee would work directly with the operations committee and make recommendations to the ECC leadership and other stakeholders as identified. The recommendations would be related to technology needs and cybersecurity where applicable.
- **Testing Phase**

- Testing of capabilities is an absolute requirement and critical to success. Interviews for this report revealed that all personnel, from the most senior to the most junior, were engaged in testing this solution multiple times. Initial testing included only non-emergency calls. Once it was established that this capability worked, non-emergency calls were operationalized, and emergency calls went into the testing phase. The emergency (9-1-1) call testing phase was extensive and went through multiple iterations. Once all levels of staff were comfortable with emergency calls being handled by remote call takers, the transition phase could begin.

- **Implementation/Transition Phase**

  - The primary emphasis in this phase is identifying and resolving services and technology issues. Again, the champion or other project manager should facilitate this.

- **Operational Phase**

  - The primary emphasis in this phase is the operational roll out of the solution. Everyone involved in the initial operational phase should have been involved, at one level or another, in the testing and transition phase. This ensures that the initial operational cadre consists of experienced users. They should be familiar with backup and recovery issues, fail over procedures, how to contact the prime (or backup) ECC when needed and how to operate all systems deployed to their location.

  - The operational phase is the "long haul" portion of the project. This is where all the planning, testing, and transition work comes together to realize the final product as a working solution.

- **Continuous Review**
  - Make sure the work is distributed fairly, and the gradual addition of tasks to the core set of responsibilities has not made the job more complex than it needs to be. ECCs should plan accordingly to determine all work assignments and distribution of the remote and ECC premise based assigned work. Mapping this out ahead of time will ensure that responsibilities are not missed in the transition.

- **Rotate Challenging Assignments**
  - Consider rotating the toughest assignments from day to day, or from the first half of a shift to the second half, so the most challenging work is shared, and nobody has to bear the full brunt of it for a full week or shift.

- Also consider the order in the queue that remote call takers will occupy versus ECC premise-based call takers (if there are still personnel onsite tasked with taking calls). One of the issues identified during interviews was the fact that remote call takers were "last in line" if there were call takers located on premise. Many of the individuals interviewed stated they believed it would be a better use of resources if the remote call takers were first.

- **Keep the Workload Manageable**
  - Monitor activity levels for remote call takers, ECC premise-based personnel, and the use of overtime. If there are particularly tough challenges, work with employees to redesign the manner in which the work gets accomplished.

- **Provide Ongoing Support**
  - Always provide support and training when employees are asked to take on additional tasks like remote call taking or when there is a change in equipment or procedures. The importance of establishing a training program for both new and veteran employees cannot be emphasized enough.

- **Learn from Each Other**
  - This may be one of the most important tasks for the success of this particular project. Alexandria has provided insight and a "how we did this" look at the creation, testing, and implementation of a remote call taking solution. Using this report and Alexandria DECCs experiences is a first step in moving this solution from a single ECC to many, many more. As the Emergency Communications community becomes aware of this solution on a larger scale, Alexandria will be the first, but not the only, agency to actually operationalize remote call taking from outside of the physical ECC.
  - As this propagates beyond a single center, it is important that agencies and leaders share information, both positive and negative. Ask other managers outside of your organization about strategies they have used and found successful in easing the transition from old to new software, from strictly premise based to a hybrid premise / remote call taking solution, and eventually to a hybrid call taking / dispatch operation.
  - There is the potential for many agencies to successfully implement their own versions of this remote call taking capability. Observations from

lessons learned and model programs can be a significant benefit to all ECCs.

Conclusion

The COVID-19 Pandemic has resulted in more challenges than any event in recent history. This event occurred on a worldwide scale and impacted every sector of the population. For emergency services in general, and emergency communications in particular, the pandemic has created a new set of realities that no one in our profession ever truly contemplated. Until COVID-19 became a reality, no one had any concept of just how far reaching this type of event could actually be.

Alexandria DECC, like every other ECC in the nation, was prepared for a variety of scenarios but they were not prepared for this. However, because of the construct of their systems, the modern equipment, and solutions they employ, the location of their facility in the NCR – with cooperative work already underway regarding network resiliency and redundancy – and the forward leaning approach the agency was willing to take, they developed a first of its kind solution.

Through this approach they incorporated multiple vendors like Motorola, Central Square, Eventide, RapidSOS and Smart911. They then engaged capabilities such as those offered by FirstNet, and they created a collaborative method to implement policies, procedures, and services that would benefit responder agencies and the public alike. From the initial decision to split shifts between physical centers, implement the Isolation Team, and develop remote call taking capabilities into an operational reality, the focus of the Alexandria DECC team was to take care of their people while ensuring continuity of operations for the agencies and citizens they served.

Once the concept was proved, and the solution was an operational reality, Alexandria then set out to share what they learned so that other agencies could benefit from their lessons and experiences, potentially employing similar methods to solve similar problems. This report is the culmination of that desire to document, and share, their remote call taking approach. Alexandria DECC and ACS both hope that the information contained herein, and the experiences shared by Alexandria, will provide a roadmap to success for others. The ultimate goal of any such endeavor is to ensure the health and safety of professional public safety telecommunicators nationwide, thus ensuring they can continue to provide the critical, lifesaving services rendered by every ECC in the Nation.

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	Department of Emergency Communications Standard Operating Procedures	
Remote Call Taking		
Accreditation Standards: 2.1.5a, 2.2.1, 2.3.1, 6.6.1		Revision Date: 04/01/2020
Associated:	Supersedes: SOP 1.01 Mission and Organization	Authorized: *Renee Gordon 8/19/16*

I. PURPOSE/POLICY:

To provide remote call taking/handling for the Department of Emergency and Customer Communication (DECC 911/311), in both an emergency and non-emergency capacity.

II. BACKGROUND

The Emergency Call Center (ECC), Department of Emergency and Customer Communication (DECC 911/311) is an important and vital link of communications with respect to reporting lifesaving emergencies and the protection property. DECC is the primary Public Safety Answering Point (911 PSAP/ECC) for the city of Alexandria. DECC centrally manages and handles all emergency and non-emergency calls for assistance within the city of Alexandria.

III. DEFINITIONS:

***PSAP* – Public Safety Answering Point**

VESTA Mobile Command Post – Portable call taking/handling equipment

Remote working – Working from a location other than the physical PSAP location (i.e., home residence, etc.)

Hotspot – Wireless communication device capable of providing reliable connectivity to necessary equipment

CPE – Customer provided/preferred Equipment

ECC- Emergency Call Center

IV. RULES AND PROCEDURES:

A. An employee working remotely must keep all equipment secure, clean and operational. The employee shall be solely responsible for the issued equipment.

B. Employees must notify the on-duty supervisor immediately of any equipment issues or malfunctions. The supervisor will document and make the necessary notifications regarding any equipment issues to DECC IT.

C. Call Takers will report any "dropped calls" to the on-duty supervisor to include the disposition of the dropped call, i.e., where did it go? how was it handled?

D. A remote employee/call taker shall call/report to the on-duty supervisor upon the beginning and ending of their shift.

E. Remote employees/call taker shall operate just as if they were physically in the center and are required to follow all current policy and procedures as outlined for PSCO's and call takers.

F. The only exception to remote call taking is, all abandoned calls shall be handled by the physical center(s). 3600 Wheeler Ave. & 2001 Mill Rd.

G. Remote employees shall not reassign, giveaway or alter any department assigned equipment without the authorization/approval of the Director and or Deputy Director.

H. The physical location of any DECC equipment shall be reviewed and approved by the Director and or Deputy Director prior to implementation.

I. 911 Remote call takers will work no more than two months consecutively, unless authorized/approved by the Director or Deputy Director.

J. Any overtime shall be coordinated and or authorized thru the operational supervisor(s) and or Watch Officer.

K. At no time, should any equipment be left unattended and or left on when not in use for official duty.

L. **Workman's Compensation and report of injuries shall be followed in accordance with City AR 6-27 and reported to the operational supervisors/Watch Officer within 24 hours of an injury or illness.**

M. **Employees working remotely shall make every effort to ensure there is no background noise or interference when handling/processing a call for service.**

N. **Employees shall use the department issued FirstNet Mi/Fi-Wi/Fi (Hotspots) for connectivity solutions of all department issued equipment. Personal Hotspots shall not be used as a connectivity solution for department issued equipment or activity unless exigent circumstances exist, and approval has been authorized by either the Director or Deputy Director.**

2. SUPERVISORS

A. **Supervisors shall be responsible for their respective remote call taker(s) and shall monitor productivity and use. Documentation both operationally and administratively shall be recorded accordingly.**

B. **Supervisors shall be responsible for documenting and making the appropriate notifications for any equipment and or employee issues.**

C. **Supervisors shall have a continuing duty to critically evaluate all aspects of the position. They are expected to review policies and procedures in order to achieve and ensure Departmental objectives.**

D. **Supervisors are accountable for every aspect of their assigned area. Within policy, guidelines and legal constraints, supervisors have the authority to coordinate and direct assigned employees and other allocated resources toward achieving all Departmental goals.**

E. **Supervisors in conjunction with the Watch Officer, shall ensure all operational employees are eligible and have taken the city's required tele-work training, specifically for remote operations.**

Appendix B –Remote Call Taking Statistics

This Appendix provides a snapshot view of the total number of calls taken by the Alexandria DECC from the period March 2020 until December 2020. The calls are then broken out by call type and the final column represents the total number of calls taken by Remote Call Takers.

For this period, the percentage of calls taken by Remote staff accounted for **20.7%** of all calls.

Month/Year	Total Calls Received	9-1-1 Calls	Non-Emergency (Inbound)	Non-Emergency (Outbound)	Remote Call Takers (Inbound and Outbound)
Mar 2020	24,200	5,118	13,101	5,314	**2,121**
Apr 2020	20,760	4,121	10,482	5,553	**8,642**
May 2020	23,467	4,712	11,701	6,725	**6,921**
Jun 2020	24,488	5,040	12,449	6,603	**5,782**
Jul 2020	28,211	5,786	14,079	7,701	**5,462**
Aug 2020	26,045	5,377	13,502	6,647	**3,642**
Sep 2020	25,381	5,123	13,176	6,575	**3,097**
Oct 2020	25,532	5,398	13,585	6,236	**3,482**
Nov 2020	22,905	4,939	11,965	5,685	**4,291**
Dec 2020	22,581	4,775	11,632	5,620	**7,005**
TOTALS	243,570	50,389	125,672	62,659	**50,445**

Appendix C – List of Abbreviations

ACS	APCO Consulting Service
ANI	Automatic Number Identification
ANSI	American National Standards Institute
ALI	Automatic Location Identification
ANS	American National Standards
APCO	Association of Public Safety Communications Officials
AVL	Automatic Vehicle Location
CAD	Computer Aided Dispatch
CAMA	Centralized Automatic Message Accounting
CBI	Colorado Bureau of Investigations
CCIC	Colorado Crime Information Center
CCSO	Clear County Sheriff Office
CJIS	Criminal Justice Information Services
COOP	Continuity of Operations Plan
CPE	Customer Premise Equipment
CPR	Cardiopulmonary Resuscitation
CSRIC	Communications, Security, Reliability and Interoperability Council
DHS	Department of Homeland Security
DoS	Denial of Service
DTRS	Digital Trunked Radio System
EAP	Employee Assistance Program
EAV	Equalized Assessed Valuation
ECC	Emergency Communication Center
EMD	Emergency Medical Dispatch
EMS	Emergency Medical Services
ETSB	Emergency Telephone Service Board
FEMA	Federal Emergency Management Association
FRN	FCC Registration Number
FCC	Federal Communications Commission
FRN	FCC Registration Number
GIS	Geographic Information System
HVAC	Heating, ventilation, air conditioning
ICS	Incident Command System
IGA	Intergovernmental Agreement
IP	Internet Protocol
IT	Information Technology
KPI	Key Performance Indicator
LMR	Land Mobile Radio
MHz	Megahertz
MLTS	Multi-Line Telephone System
NAED	National Academies of Emergency Dispatch
NCIC	National Crime Information Center
NENA	National Emergency Number Association

NFPA	National Fire Protection Association
NG9-1-1	Next Generation 9-1-1
NICCS	National Initiative for Cybersecurity Careers and Studies
NIST	National Institute of Standards and Technology
NLEEC	National Law Enforcement Emergency Channel
PSAP	Public Safety Answering Point
PST	Public Safety PST
PUC	Public Utilities Commission
QA/QI	Quality Assurance/Quality Improvement
RCCC	Rio Blanco Communications Center
RETAINS	Responsive Efforts to Assure Integral Needs in Staffing
RFI	Request for Information
RFQ	Request for Qualifications
RMS	Records Management System
SIP	Session Internet Protocol
SMART	Specific, Measurable, Attainable, Relevant, and Time Bound
SOP	Standard Operating Procedure
TDD/TTY	Telecommunications Device for Deaf/Teletypewriter
TFOPA	Task Force on Optimal PSAP Architecture
UHF	Ultra High Frequency
ULS	Universal Licensing
UPS	Uninterruptible Power Supply
VoIP	Voice over Internet Protocol
VHF	Very High Frequency
WRB	Western Rio Blanco 9-1-1 Board

Appendix D - National Institute of Standards and Technology (NIST) Framework for Improving Critical Infrastructure Cybersecurity

- **Step 1: Prioritize and scope.** The organization identifies its business/mission objectives and high-level organizational priorities. With this information, the organization makes strategic decisions regarding cybersecurity implementations and determines the scope of systems and assets that support the selected business line or process. The framework can be adapted to support the different business lines or processes within an organization, which may have different business needs and associated risk tolerance. Risk tolerances may be reflected in a target implementation tier.

- **Step 2: Orient.** Once the scope of the cybersecurity program has been determined for the business line or process, the organization identifies related systems and assets, regulatory requirements, and overall risk approach. The organization then consults sources to identify threats and vulnerabilities applicable to those systems and assets.

- **Step 3: Create a current profile.** The organization develops a current profile by indicating which category and subcategory outcomes from the framework core are currently being achieved. If an outcome is partially achieved, noting this fact will help support subsequent steps by providing baseline information.

- **Step 4: Conduct a risk assessment.** This assessment could be guided by the organization's overall risk management process or previous risk assessment activities. The organization analyzes the operational environment in order to discern the likelihood of a cybersecurity event and the impact that the event could have on the organization. It is important that organizations identify emerging risks and use cyber threat information from internal and external sources to gain a better understanding of the likelihood and impact of cybersecurity events.

- **Step 5: Create a target profile.** The organization creates a target profile that focuses on the assessment of the framework's categories and subcategories describing the organization's desired cybersecurity outcomes. Organizations may also develop their own additional categories and subcategories to account for unique organizational risks. The organization may also consider influences and requirements of external stakeholders such as sector entities, customers and business partners when creating a target profile. The target profile should appropriately reflect criteria within the target implementation tier.

- **Step 6: Determine, analyze, and prioritize gaps.** The organization compares the current profile and the target profile to determine gaps. Next, it creates a prioritized action plan to address gaps – reflecting mission drivers, costs and benefits, and risks –

to achieve the outcomes in the target profile. The organization then determines the resources, including funding and workforce, necessary to address the gaps. Using profiles in this manner encourages the organization to make informed decisions about cybersecurity activities, supports risk management and the organization's ability to perform cost-effective, targeted improvements.

- **Step 7: Implement action plan.** The organization determines which actions to take to address the gaps identified, if any, in the previous step and then adjusts its current cybersecurity practices in order to achieve the target profile. For further guidance, the framework identifies example informative references regarding the categories and subcategories, but organizations should determine which standards, guidelines, and practices, including those that are sector specific, work best for their needs.

An organization repeats the steps as needed to continuously assess and improve its cybersecurity. For instance, organizations may find that more frequent repetition of the orient step improves the quality of risk assessments. Furthermore, organizations may monitor progress through iterative updates to the current profile, subsequently comparing the current profile to the target profile. Organizations may also use this process to align their cybersecurity programs with their desired framework implementation tier.

Appendix E – Other Documents, Studies, and Standards Consulted

1. Budget and financial documents
2. Workforce Information
3. Standard operating guidelines/procedures
4. Policies
5. Call volume and call processing statistics
6. Agency chain of command
7. Information technology (IT) structure and information
8. Security policy
9. Agency website
10. Dispatch protocols
11. FCC ULS for LMR licensing
12. Agency Continuity of Operations Plan (COOP).

Appendix F – Table of Figures

Appendix G – Table of Tables