

Cary, North Carolina



PSAP Service Improvement Study Analysis of Two Alternatives

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Executive Summary

The Town of Cary engaged **FE/Kimball** to provide a PSAP Service Improvement Study to the Towns of Cary, Apex and Morrisville. The scope of this study was to gather and analyze data and information to identify roadblocks and requirements that must be considered in a change of service model. We offer recommendations regarding workload, staffing, space, technology needs and cost estimates.

FE/Kimball interviewed individual and groups of stakeholders to identify service issues experienced by the response agencies and requirements expressed for a potential future service by the Town of Cary. The key service areas noted include fire station alerting, situational awareness, automatic vehicle location (AVL), emergency medical and fire dispatch (EMD and EFD), interoperability, improving response times, and improving call processing to bring it more in line with industry standards.

There are some technical concerns or limitations that would need to be addressed should a service model change move forward for the three Towns. These areas are the geographic information system (GIS), mapping and master street address guide (MSAG); emergency service IP-network (ESInet) and 9-1-1 call routing; fire station alerting; radio encryption, network, equipment and applications; computer aided dispatch (CAD); mobile dispatch system (MDS); connectivity and technical support; ASAP to PSAP (automated secure alarm protocol to public safety answering point); text paging; logging recorder; automatic vehicle location (AVL).

To demonstrate an anticipated workload for a regional center serving the three Towns, **FE/Kimball** calculated the projected number of positions needed to handle the workload and the number of full time equivalent (FTE) employees needed to staff the positions during normal, slow and peak periods around the clock. The calculations were made with industry tools and are based on cited industry standards and best practices. The results of these calculations indicate that up to four positions are needed for call taking and three positions for dispatching. Note that one of the positions would serve as the working supervisor's position. We recommend 24 to 29 FTE to handle the anticipated workload and to staff the positions. The current staff level of 22 or expanding to 24 is projected using the supervisory staff as working supervisors, which is the current Cary model. Expanding staff to 29 allows for dedicated supervisors that are not assigned to answer calls or dispatch.

Backup capabilities for the Town of Cary are currently in compliance with the NC9-1-1 Board guide to maintain a backup that can accommodate 100% capacity of the primary center.



FE/Kimball recommends a service contract model of regionalization for the three Towns allowing the Town of Cary to maintain the current PSAP support structure that includes the ownership, care and maintenance of the operation.



1. Introduction

The Town of Cary engaged **FE/Kimball** to provide a PSAP Service Improvement Study to the Towns of Cary, Apex and Morrisville, North Carolina. The Towns are seeking information necessary to determine if service improvements would be gained through a transition of services for the communities and response agencies. This study examines the following two options:

1. The Town of Cary to continue as the primary answering point for 9-1-1 and dispatch for the Town of Cary's police and fire services.
2. The Town of Cary to add the provision of primary answering of 9-1-1 calls for the Towns of Apex and Morrisville.
 - a. Dispatching police and fire services for the Town of Morrisville
 - b. Dispatching fire services for the Town of Apex
 - c. Transferring 9-1-1 calls requesting Apex Police to the Town of Apex

Areas to be examined in this study include the staffing needs, estimated costs for changes to the operations and technology, as well as a funding mechanism and any related limitations.



2. Study Methodology

FE/Kimball approached this effort via a discovery process in which statistical, demographic, technology inventory, budgets and associated documents were gathered and analyzed. Observational periods in each PSAP were beneficial in assisting **FE/Kimball** to understand the operational methodologies and workflow processes. Interviews with individual decision makers and group interviews with stakeholders in the two PSAPs, and each of the response agencies, provided critical insight into the concerns and expectations of those affected by any change in the current configuration.

The data and information gathered in the discovery process was analyzed for any roadblocks or unique requirements that must be considered in a change of service model. Statistical data was used to calculate workload, staffing, space and technology needs and cost estimates.



3. Current Conditions

On October 16, 2017, a teleconference venue was employed to conduct a project initiation meeting with the Town of Cary point of contact to clarify scope and schedule for this PSAP Service Improvement Study. On this date, the **FE/Kimball** team provided a survey tool (a workbook of spreadsheets) for distribution to the participating Towns to gather agency specific contact information, demographic data, workload statistics, an inventory of technology, space and facility data, and PSAP budget data.

From October 30, through November 2, 2017, the **FE/Kimball** subject matter experts (SMEs) visited the Towns' PSAPs and public safety agencies and support staffs. This site visit included individual key stakeholder interviews of agencies' heads, management and support staffs; and focus group meetings with cross-sections of representative stakeholders from the PSAPs' operations and support staffs, and the served response agencies. The **FE/Kimball** team observed in the Cary and Apex PSAPs to gain an understanding of the call flow and business model. Documentation and data elements were requested of the Towns and provided in the weeks that followed the onsite data collection effort. Teleconferences were conducted to interview representatives of the Fire agencies. An individual interview was conducted with the Raleigh-Wake Emergency Communications Center (RWECC) Director. **FE/Kimball** requested budgetary information on the service fees currently collected from the Towns of Apex and Morrisville, which the RWECC staff provided.

The following are current service models supporting emergency communications for the study participants:

- The Town of Cary is a primary PSAP that answers 9-1-1 calls routed from within their municipal boundaries and dispatches the Cary Police and Fire response agencies. The 9-1-1 calls requesting EMS response receive pre-arrival instructions from the Cary call-takers while the RWECC EMS dispatcher is notified via radio to dispatch the EMS response. Cary then monitors and supports the EMS response within their municipal boundaries.
- The Town of Apex is a secondary PSAP to RWECC as the RWECC answers all 9-1-1 calls routed from within the Apex municipal boundaries and transfers all police response calls to Apex. RWECC dispatches all EMS and Fire response for Apex.
- The Town of Morrisville does not operate a PSAP; therefore, RWECC answers all 9-1-1 calls routed from within the municipal boundaries of Morrisville, and dispatches all EMS, Fire, and Police response for Morrisville.



The expressed issues with the current 9-1-1 call answering and dispatching service for Apex and Morrisville, with direct impact on Cary, focus on the service and technological limitations. From the individual and group interviews, and observations, the following summation of issues documents the issues, and includes vision/ideas for improvement from the participating agencies' staffs and stakeholders.

3.1 Service Issues and Requirements

Based on the numerous interviews, conversations and background information provided by stakeholders representing the Towns of Apex and Morrisville, clear themes surfaced as the impetus behind seeking a possible change in service provider from the RWECC to the Town of Cary. Following is a list of areas that are service centric and are viewed as requirements and desires in the decision-making process for Apex and Morrisville, and for the Town of Cary as a potential service provider.

Fire and EMS:

- Fire Station Alerting - Should Apex and Morrisville transition to Cary for dispatching Fire and supporting the post-dispatch activities of EMS responses in their respective Towns, there will be a need to review the station alerting protocols and equipment/system. See Exhibit 1 for cost impact of equipment and connectivity to Apex and Morrisville. The current process for alerting the Cary stations of non-emergency activity such as when hydrants are out of service during the night is to announce to all stations. Modernizing the station alerting system in the future will allow selective alerts and minimize the number of over-the-air non-emergent notifications; however, as of today no plans are in place to change the existing system. Note that Cary does not expect to change current Fire Station Alerting methods. Every Apex and Morrisville Station will need a primary/backup radio, wiring and buzzers to meet current alerting methods. Rough cost estimate would be \$20K per station. Alerting enhancements after service level change can be investigated.
- Situational awareness improvements - all three Towns' fire services are seeking improvements in situational awareness of activities that impact their stations through centralizing activities and notifications between law enforcement and fire services.
- All Fire agencies desire to be equipped with and dispatched using automatic vehicle location (AVL). This capability will allow ability to put time parameter on dispatches for volunteer stations as well. See Exhibit 1 for costs of AVL equipment, license and installation per vehicle that is compatible with Cary's system requirements.



- All Fire agencies anticipate improvements to how emergency medical dispatch (EMD) and emergency fire dispatch (EFD) is currently administered by the Raleigh-Wake Emergency Communications Center (RWECC). Apex and Morrisville desire to allow more leeway for dispatchers to triage and re-classify calls based on response plans.
- Standardization of unit/apparatus labeling may be required if Apex Fire and Morrisville Police and Fire transition service to Cary.
- Interoperability improvements gained through consolidation are desired by all agencies, particularly in coordinating multi-agency and multi-jurisdictional responses. These improvements can come from modernizing dispatch protocols and technology. See Exhibit 1 for technology and connectivity changes that will contribute to interoperability improvements. These improvements will have a positive impact on mutual aid and joint responses in the three Towns.
- Apex and Morrisville Fire are seeking the ability to build out CAD data sets that are currently not available in the arrangement with RWECC. Examples of the capabilities are building out additional alarms/second alarms and beyond to accommodate requests for additional units without having to specify the unit/apparatus; and the ability to perform status changes from mobile CAD in the field.

Other areas of service improvements include:

- Ability to develop run orders by agency, rather than have career/paid fire agencies built in CAD and dispatched as the rural/volunteer County fire agencies are.
- Resolution of response times issues; improve performance time and quality; seeking to meet industry standards NFPA 1221, accreditation with CPSE for alarm processing (call answering to dispatch), response time combined turnout to travel time (time dispatch to check en route, to arrival).
- Prioritization of calls in fire station alerting system. Currently, in Locution, stations are sequentially dispatched which requires waiting for a clear channel and RWECC can only dispatch three stations at a time, e.g., Raleigh Fire, County EMS, County Fire. There is only one alerting channel (VHF paging), which creates a bottleneck. There is no pre-alert and only one station (Station 5) will have control of station lights associated with the alert. There is no other remote-controlled functionality tied to Locution, such as opening/closing doors, zone specific alerts within a facility or controlling appliances.



- Requirement for coordinated response methods and tools. Apex and Morrisville typically run more fire calls with Cary than with Raleigh-Wake, unless it is a HazMat or other regional response team. If dispatched by Cary, need the ability to forecast effective response force via mapping tool. The agencies envision prioritizing response aligned with Cary - based on # of staff needed in response, special response, defined risk levels; emergency or backup situations that are handled in a mutual aid response. The current arrangement with RWECC via Wake Emergency Communications Organization (WECCO) prevents actual dispatch coordination across jurisdiction. Current method of coordinating response requires contact with RWECC by Cary for dispatching of Morrisville and/or Apex Fire. Due to delays in dispatching, it is common for Cary to arrive on a scene located in Morrisville or Apex, prior to those Towns' fire departments. Ineffective coordination is also evident in responses to events on interstate 40 (I-40), in that 10 to 12 apparatus are dispatched from Cary, Raleigh-Wake and Durham County.
- Solution for rural response where Morrisville and Apex noted that their agencies respond to rural areas with limited or no hydrants, requiring tanker trucks in response plans. Both agencies understand Cary does not have rural response areas.

Note: Stakeholders spoke with AT&T regarding changing this routing. The request for this change must come from the Towns of Apex and Morrisville.

- Morrisville and Apex requirement for operations/tactical talkgroups to be monitored when they are on scene. RWECC has provided this service. Cary Fire dispatches on primary Fire Channel, then apparatus is assigned to a monitored tactical channel; however, one person monitors all tactical channels. Morrisville and Apex understand that not expanding the monitoring capabilities of Cary staff may be an issue.
- Standard Operating Guidelines (SOGs) - The three Towns are currently working on a mutual and standardized Fire SOG. Completion of this SOG will be a requirement of any future shared services model.
- Electronic Patient Care Reporting (ePCR) - Morrisville currently submits ePCR by entering data into their records management system (High Plains RMS) and do not have access to the County's ePCR.
- The Towns' fire services require improved processing times over that currently provided by RWECC.



- Fully integrated fire resources for a closest unit response protocol all three Towns - This is thought to be best realized by building out the fire agencies and responses as one agency in a shared CAD between Morrisville, Apex and Cary. Currently, Cary's fire resources are not built into the RWECC CAD responses.
- Morrisville and Apex expressed belief that a transition of service to Cary is an opportunity to improve service over service currently provided by RWECC. Customer service issues include an inability to make timely changes to response plans, describing the current effort as requiring considerable notice to the RWECC. Apex Fire also described the disjointed communication required after RWECC dispatches a fire incident in Apex response area. The Apex dispatch center follows the Apex fire units to the assigned tactical channels where the incident commander notifies Apex of any needs. If additional resources are needed, Apex can add units to existing fire events or they call RWECC to relay the request depending on the type and number of resources needed.
- Currently, Cary provides pre-arrival instructions via EMD and emergency fire dispatch (EFD). Cary also communicates with EMS units responding in the Town via text message with additional/supplemental information during a response.
- Apex requires ease and timeliness of access to Apex Fire data, as opposed to current issues acquiring data from RWECC.

Law Enforcement Dispatching:

- The Morrisville and Cary responders noted improvements in situational awareness would be a benefit from having all law enforcement units on the same talkgroup. Consideration should be given to the possibility of sharing a talkgroup during less busy hours such as overnight. Cary and Morrisville expressed interest in having two law enforcement talkgroups.
- Morrisville and Apex see advantages of transitioning to Cary for 9-1-1 call answering, because RWECC reportedly only provides minimal input, minimal information which creates the need for Apex to phone the caller back, and leaves Morrisville to request additional information from RWECC which may or may not follow up with caller.
- The three Towns see a potential shared services model as an opportunity to standardize protocols and operational methodology that will improve overall



service. All three police agencies are accredited and see improved services as an opportunity to acquire communications center specific accreditation.

- Morrisville police are seeking advancements in the tools that can improve agency coordination, data sharing and response such as AVL and reporting tools and data better suited for Crime Analysis. See Exhibit 1 for costs of AVL equipment, license and installation per vehicle compatible with Cary's system requirements.
- Morrisville police must currently run two mobile data applications, one to access mobile CAD and another to access their records management system and the National Crime Information Center (NCIC) and the Division of Criminal Investigation (DCI). Morrisville records staff are available Monday through Friday during normal business hours; after hours requests for criminal history and local checks must be made to RWECC. Note that Cary/Morrisville PD and IT Departments met and developed a plan to address the records need; details of this plan are available through the Cary/Morrisville PD and IT Departments.
- Morrisville police has a dedicated talkgroup monitored by RWECC, with six to seven patrol units typically on duty around the clock. They use mobile CAD to mark out on officer-initiated calls, except for traffic stops which they mark out on radio for officer safety. RWECC does not run NCIC/DCI searches, the information is placed in the comments of the CAD event and the Morrisville officers are expected to run the query themselves. There was no preference stated by Morrisville police, but they do want to understand how the dispatch support services will be rendered by Cary.

Back-up Plans:

Cary currently relocates the communications center to Fire Station 6. Should Apex 9-1-1 call taking and fire dispatch transition to Cary, the back up plans and perhaps location will require adjustment to potentially include Apex. Apex does not currently have a back-up location. Routing of all 9-1-1 calls answered by Cary, that in the future may include Apex and Morrisville, will require routing to a back-up site during a short- or long-term relocation event.

Quality Assurance and Internal Operations Concerns

Morrisville and Apex see the need for an expansion of Cary support staff to provide required quality assurance/quality control (QA/QC) on EMD and EFD calls. The workload and staff will also be impacted by the addition of the two fire departments in daily operations and during surge events such as weather-related emergencies.



Service-Level Agreements (SLAs) will be required that describe the service areas Town would expect to be addressed in the SLAs.

- How DCI/NCIC validation would be handled for Morrisville. Carycommunications center staff perform all entries to DCI/NCIC for Cary.
- Administration lines call forwarding and back up, formerly went to RWECC training consoles for backup - RWECC now has all hot lines that Apexcannot forward their admin lines to - SLAs should define where these calls shouldbe routed. Cary is amenable to including failover routing of Apex's administrative lines in a service agreement.
- Ease of access and timely updates to critical data in CAD, e.g., premise hazard.
- Responsibility and accountability for all support/coordination, e.g., GIS, IT -to include distribution and coordination of data such as maintaining premise hazards. Cary's CAD Coordinator and supervisory staff handle internal systems coordination. Equipment, procurement and systems support for field units' systems will be provided by each individual agency.

RWECC has added language to a new SLA that includes performance standards; however, the RWECC is reportedly not yet meeting those standards. It is important to note that the RWECC is working to execute the SLAs and is agreeing to measure and improve performance based on standards and policy-based metrics.

The Town representatives reported that the Cary call processing times are more in line with industry standards than the RWECC. Cary noted that the PSAP and Fire Department review fire response times monthly for use in training. They also noted that they believe Cary can better support a closest unit response plan that includes traffic preemption, AVL and radio GPS.

Apex representatives require the SLA to contain specific language regarding access to associated data related to fire response in CAD. The CAD data desired includes all times tracked. This specific requirement is based on access limitations experienced by Apex in an existing relationship with Cary for water utilities.

Cary representatives noted a service expectation that should be included in an SLA will be how the after-hours municipal calls and/or notifications for Morrisville will be handled.

RWECC Interview

To provide the Towns with the perspective of the RWECC in the matters of service quality and the potential transition of specific services to Cary, a telephone interview was



conducted with the RWECC Director. The following salient points were noted and should be considered in the decision-making process by the Towns:

- The RWECC indicated that a change in the service configuration may be helpful to the Towns. The specific model described would have RWECC perform an initial dispatch for police with Cary/Morrisville picking up the monitoring and support dispatch functions. This is similar to the method currently used for fire/EMS dispatching.
- In the current network configuration and data access, RWECC is concerned there will be delay in processing 9-1-1 calls without automatic location information (ALI) routing with secondary calls.
- Due to the multi-node 9-1-1 telephone system setup at RWECC, Apex is not part of the RWECC back-up/failover if they are not a node on the phone system.
- The RWECC has dedicated call-takers, assigned by call volume, to make certain calls are answered quickly.
- The RWECC has implemented an expedited hiring and training process, with focus on training and an increase in the number of academies conducted each year. This approach has greatly reduced the vacancy rate compared to previous years. Based on the current call-taking and dispatch operations configuration, the RWECC will reach full staffing complement following the next academy scheduled for first quarter 2018. Changes or expansions to the current dispatch configuration, such as expanding the fire and EMS dispatch protocols and positions, will require further increase in staffing. The RWECC Director noted that WECO participants, which include Morrisville and Apex, must agree to an increase in RWECC staffing to accommodate an increase in fire dispatch positions. The RWECC Director is open to making changes such as dedicating fire positions to Apex and Morrisville, though there are costs associated with this that must be vetted through WECO; he does not believe said changes are the most efficient method but are better than complete separation. He also noted that he was not aware of the extent of issues held by Apex and Morrisville.
- The RWECC Director sees the current coordinated response among agencies is good, citing a recent example of a shooting incident at a local mall. He also



expressed concern about the ability to coordinate response if Apex and Morrisville, or any agencies, are separated from the RWECC.

- The RWECC Director is supportive of this study in that service delivery should be the driver of change and noted that he would like to see pursuit of a joint analysis of the Towns and the RWECC to see what other service improvements could be made.

3.2 Technology Overview

Geographic Information System (GIS), Mapping and Master Street Address Guide (MSAG)

Both Apex and Cary have ESRI enterprise licensing agreements (ELA). Morrisville has ESRI seat licensing. The Town of Cary can place all the mapping/GIS data in the Cloud and it can be accessed by all the agencies. Morrisville already provides the Town of Cary all their ESRI data via the current utilities services agreement. Cary gets a portion of Apex's mapping data any new arrangements must ensure that all agencies receive all the data they require, including any new street additions.

The Town of Cary currently makes their own MSAG adjustments and a procedure will be created for handling changes to Apex and Morrisville MSAG data. This procedure should be included in an SLA if the Towns transition 9-1-1 call-taking and dispatching to Cary.

The complexity of the process followed by Cary includes acquiring and maintaining GIS data for portions of Wake and Chatham counties. Each time these counties build a dataset, Cary must get data from both and the data must be at the parcel level as mandated to collect revenue within the town limits. Cary makes certain new street data is unique, this is key to use of the data and to the development of run orders for fire services. Should Cary coordinate the generation of run orders for Apex and Morrisville, Cary will need the street centerline, polygons, response zones and other data specific to the Towns. The current geo-file update/conversion process requires Cary to push out data to all CAD machines and update mobile units when they direct connect at station; these are scheduled updates. To take advantage of this set up, Apex and Morrisville will be connected by third-party fiber to the Town of Cary.

There is a Master Address Repository at the County level where localities will input street centerlines and addresses, with geo-fencing to limit where and what data can go into the system creating a centralized GIS data at countywide. This future capability can replace locally housed databases with one-stop, standardized, entry point. This plan may be an issue since Cary has address points and other data that far exceeds that of the County.



ESInet and 9-1-1 Routing

The statewide rollout of an emergency service IP-network (ESInet) will take the form of multiple regional networks interconnected by and through a contract with AT&T. The

Town of Cary is scheduled to receive service, connection to the ESInet, right after the RWECC. Cary representatives believe the cost should be absorbed by the state. The Town of Apex reported that they were approached by AT&T with a quote for an annual fee of approximately \$4,000 via a 5-year contract through RWECC to receive ALI with transferred 9-1-1 calls.

The routing of 9-1-1 calls relies on the accuracy of the emergency service number (ESN) which represents emergency service zones. The routing of 9-1-1 calls for the Towns of Apex and Morrisville will require a change of routing for the affected areas. These changes will impact call routing, failover and default routing. As a secondary PSAP, Apex currently has three trunks. Consideration and coordination with RWECC will be necessary to make certain failover/default routing continues to be to RWECC. **FE/Kimball** recommends a traffic study be conducted by AT&T to determine if the current number of trunks in Cary are sufficient or need to be increased. Determining trunk and routing costs and responsibility for same must be identified in an SLA, though no costs are expected for any changes in the 9-1-1 network.

The Town of Cary's current 9-1-1 trunks and future ESInet will have the ability to transfer calls to the Town of Apex existing CAMA trunks and future ESInet solution. The costs to the PSAPs is not yet fully known.

The County is the primary PSAP for the unincorporated areas of the County to which Apex and Morrisville provide primary fire protection. A decision will have to be made once Apex and Morrisville 9-1-1 calls are routed to the Town of Cary to determine routing for these 9-1-1 calls from the unincorporated areas. Traditionally they are routed to the PSAP that dispatches the primary law enforcement agency for those areas. If the agencies want to change this, they will have to coordinate and get authorization from the County.

Fire Station Alerting

The RWECC uses the application Locution for fire station alerting. The Towns of Apex and Morrisville described several issues with the use of the Locution¹ application. The current configuration and process includes dispatch data sent as a print-out first, then page is made via tones and based on apparatus type. Note that the call/event type is not provided at this point. Once Locution evokes the tones, a digital voice of event is broadcasted. In each fire station there is a CAD resource monitor that is typically small

¹ <http://www.locution.com/>



and in one location, not always visible or useful to the responders. The details of the dispatch are provided after the tone, paging and digital voice broadcast are complete.

The Town of Cary performs tones and dispatch manually, voice dispatch only. The Apex and Morrisville FDs will have to compare their existing fire alerting functionality and compare it to the functionality they will receive from Cary. In addition, there will be an estimated \$20,000 per station cost for each of these departments to migrate to Cary's fire alerting solution. This includes installing a primary radio, back-up radio, wiring and audio configuration in each fire station.

Radio encryption, network, equipment and applications

The Cary radio system is being expanded to service all of Wake County. Part of the transitional activities will be to reprogram, or purchase appropriate programmable, radio mobiles and portables. A key task will be to apply multi-key encryption (ADP) which costs approximately \$200 - \$500 per radio.

All subscriber units on the Cary system will need a P25 700/800 MHz radio with Astro Digital CAI, SmartZone, P25 9600 BAUD trunking and multikey encryption (Law Enforcement only) feature sets. All the Apex FD, Morrisville FD and Morrisville PD subscriber units need these features and functionality.

The Town of Cary currently programs their radios. Apex and Morrisville will require either Motorola or Wireless Communications to reprogram their radios. The Town of Cary will maintain all radio templates. The SLA for a transition of service must include this information as well as documentation of template(s) layout and creation.

The current system coverage was designed for 98% In-Building Coverage for 8db buildings inside the current Cary and Morrisville Town Limits and three miles beyond. Morrisville was included in the original radio coverage requirements when the system was engineered so that area should be sufficient. Apex FD conducted radio tests in their area and indicated that the coverage provided by the Cary system was sufficient.

The Towns' will consolidate all fire dispatching on a single talkgroup with tactical support channels. A new primary dispatch talkgroup will be created for the Morrisville police. Cary police uses GPS in portable radios, this and other features and functions may be beneficial to Morrisville police. SLA(s) should include how and by whom subscriber (and other equipment) will be purchased.

The Town of Cary does not use 10 codes, so Morrisville PD must migrate to plain English.

The system's radio capacity is limited to ten voice channels. Based on the size and workload of the added agencies the current system capacity should be sufficient. To



confirm capacity, the current radio usage statistics must be reviewed to make certain that the system has enough channels to accommodate additional users.

CAD

The current CAD server configuration is sufficient to add the three additional agencies with no need for any hardware upgrades.

Cary currently handles the programming of CAD data such as priority determination, units, codes, run orders, EMD, EFD. The addition of Apex and Morrisville data will require planning, and execution, and must be defined in an SLA.

All the agencies will have to work with the Town of Cary so that current and accurate run orders and response plans are provisioned in the CAD system for the new agencies. There will also be a need for provisioning other data tables associated with those agencies, such as, but not limited to, units, and personnel. Agencies, based on security rights, can access and provision data via the CAD Resource Status Monitor. Discussions can be held regarding the possibility of the user agencies maintaining this data or having Cary staff complete it. The CAD Resource Status Monitor can provide the user agencies with access to their data and the ability to run various reports.

The agencies access their data through Superior provided CAD OpsCenter licensing that provides view-only access. This is a browser-based application that provides secure log-on and access for users in remote locations. The application provides:

- View open/active calls
- Search event history
- Retrieve detail on calls for service
- Unit times
- Event narrative
- Display active events on mapping

The Town of Cary will provide a CAD data push to the user agencies similar to that currently received from RWECC. The agencies can use this data for their records management systems.

Wake County is planning an interface to/from Cary's CAD system with a central repository server and application (FatPot) that will require adaptation to accommodate any change to the number of agencies served.



Freedom is an application that extends CAD data and functionality to authorized user's smartphones and tablets. The Cary system is configured for this application, so users can add this functionality for \$400 per device.

Mobile Dispatch System (MDS)

The current MDS in use by the Towns have various operating systems, applications and interfaces. If the Towns of Apex and Morrisville transition to Cary, there may be benefit as Cary performs updates frequently. Consideration to cost is important as the County currently charges for mobile data.

The Fire mobile data system platform includes Fire Mapping (Marvelous), AVL, Pre-Plans, 1st Look Pro², Firehouse³, HighPlains⁴. The police mobile systems include LERMS (OSSI), Accident reporting (TraCS), Active 911⁵, iMaps⁶, eCitations, and CJLeads⁷.

The Town of Cary provided hardware specifications to the agencies for mobile data computers (MDC) that will be added to their system and access their mobile data server. Agencies will have to incur a cost since their current hardware is not compatible and requires replacement. Table 1 lists these estimated costs.

Table 1 estimated MDC costs

MDC Costs Per Unit		
Item	Costs	Recurring
Lenovo 470 Laptop	\$ 1,300.00	\$ -
MS Office	\$ 300.00	\$ -
NetMotion	\$ 110.00	\$ -
2FA	\$ 60.00	\$ -
Disk Encryption	\$ 200.00	\$ -
Subtotal	\$ 1,970.00	\$ -
Data Charges	\$ 480.00	\$ 480.00
Superion CAD Client	\$ 900.00	
Total	\$ 3,350.00	\$ 480.00

The new agencies will also be required to procure Superion MDC client licenses. This software provides voiceless dispatch, status updates, messaging, and query. Mapping and AVL is also included in the cost. Superion also provided services costs for the

²<http://www.cadzone.com/first-look-pro-features-for-fire>

³<http://www.firehouse.com/>

⁴<http://highplains.com/indexhtml>

⁵<http://active911.com/>

⁶<http://www.wakegov.com/gis/imaps/Pages/default.aspx>

⁷<https://it.nc.gov/cjleads>



implementation of the new agencies MDCs. These services include project management, configuration, installation and training.

The new agencies will use a commercial wireless air card to connect with and authenticate their Town's NetMotion server. They will then connect to Cary's mobile server via a third-party fiber connection. This configuration also provides the agencies with access to other applications on their individual networks.

Connectivity and Technical Support

For authentication Cary uses two-factor authentication (2FA) and active directory (AD). Both Apex and Morrisville will authenticate by accessing their own NetMotion server and then will connect to Cary via third-party fiber. Cary will build network trusts between the agencies to handle active directory⁸. The Towns noted that an appropriate and robust level of technical support across all systems must be part of an SLA(s).

Apex already has a NetMotion server installed and Morrisville is currently installing a new one. There will also be some additional costs for upgrades and additions to routers and firewalls.

Fiber connectivity between the Town of Cary, Town of Apex and Town of Morrisville will be provided by a third-party fiber, ATT ASE 100Mbps.

The Towns will have to coordinate on how software updates will be applied to the hardware. This includes Windows Server Update Services (WSUS) and PDQ Deploy for installation and patches.

ASAP to PSAP

ASAP to PSAP is in place at Cary PSAP accepting remote entry into CAD from alarm companies reporting activations of fire, burglar, and other premise alarms. Expansion of this service to alarm companies doing business in Apex and Morrisville will be needed.

Text Paging

The application PageGate (an SMS text message server) is used for notifying response agencies at the time of a CAD entry. Cary's CAD Coordinator will control requested changes, additions and deletions to the paging system.

⁸ <https://www.netmotionsoftware.com/>



Logging Recorder

The Town of Cary's logging recorder has the channel and talkgroup capacity to add the new agencies. The current Cary recorder is limited to 255 talkgroups per AIS. They are currently recording 164 P25 talkgroups which leaves 94 available for expansion without additional licensing. Apex currently has 32 talkgroups and Morrisville has 17 talkgroups. By adding these 49 additional talkgroups, the total will be 213. Cary's current retention period is 60 days.

There will be a cost to reconfigure the recorder and add all the new talkgroups. An additional radio and recorder interface will be needed at the backup center for the additional Morrisville PD dispatch talkgroup.

The plan is to selectively send recordings of Apex 9-1-1 calls from the Cary recorder to the Apex logging recorder. The recorder vendor, Carolina Recording Services, must be contacted and will be providing a solution and associated costs to connect the two recorders.

The recording policies will need to be included in an SLA including the agreed upon retention periods, and storage requirements.

AVL

Morrisville and Apex Fire do not currently have AVL. The MDC costs include the cost for including AVL. Cary will require the new agencies to acquire and implement AVL to align with Cary dispatch capabilities.



4. Projected Workload and Staffing Levels

To provide efficient service to the public and local emergency services, PSAPs must always maintain an adequate number of qualified staff on duty. When this does not occur, service quality can diminish and the short and long-term effects on employees often lead to staffing issues, overworked personnel and attrition increases. In addition, diminished service to the PSAP stakeholders leads to an increase in complaints and a reduced level of confidence in the communications center operations.

Determining appropriate staffing levels for a multi-agency/multi-discipline PSAP is a complex process that involves a combination of mathematical calculations based on a quantifiable work load, such as 9-1-1 and administrative call volume, incidents requiring dispatch services and number of dispatch positions required.

Call volume is the prime factor in determining the number of trunks, workstations and positions needed to handle a PSAP's projected call-taking workload. The NENA standard is to answer 90 percent of 9-1-1 calls within 10 seconds. The NFPA standard, used by the Insurance Services Office (ISO), is to answer 95 percent of calls on emergency lines within 15 seconds.

The first step in estimating staffing levels is to estimate the total call volume the PSAP will handle, including both 9-1-1 and ten-digit emergency and non-emergency phone calls. To determine these statistics, we used 2014 through 2016 call volumes submitted by the Cary and Apex PSAPs. Raleigh-Wake 9-1-1 is unable to pull telephone statistics by specific Town so a breakdown of 9-1-1 wireline, 9-1-1 wireless and ten-digit administrative phone calls was not available for Morrisville. Estimates based on population in comparison with the other participating agencies were generated and used.

The combined 9-1-1 call volume for the two PSAPs and the Town of Morrisville in 2016 was 63,911 and the combined ten-digit emergency and non-emergency call volume for the Town of Cary and Town of Morrisville was 117,175. The total call volume for the two PSAPs and Town of Morrisville in 2016 was 181,086. This total call volume figure is used as a baseline estimate in Table 2. The Town of Apex ten-digit emergency and administrative phone calls is excluded from the following table as their communications center will continue to receive and process those calls. Table 2 shows reported incoming phone call volumes for each PSAP by year, totals for all PSAPs by year and averages.



Table 2 - Estimated Total Call Volume

Agency	Total Phone Calls			
	2014	2015	2016	Average
Apex	5,431	2,432	3,532	3,798
Cary	162,199	163,229	156,003	160,477
Morrisville	22,496	20,996	21,551	21,681
Total	190,126	186,657	181,086	185,956

The next step is to calculate the number of call-taker positions needed to manage the call volume. Table 3 reflects the monthly and per-hour estimated call volume determined from the annual statistics supplied to **FE/Kimball**. The Cary PSAP provided hourly call volumes for their busiest month and that data was used to determine the combined busy hour estimates.

Table 3 also highlights the slowest and busiest hours in the hourly table. We arrived at the number of call-taker positions listed in the hourly table by using an Erlang C calculator methodology with the following best practice and current PSAP call performance standards:

- Service level objective of 90 percent calls within 10 seconds or less
- Average talk time of 95 seconds (as provided by Cary in survey)
- Average after-call wrap up time of 30 seconds

Table 3 - Hourly Call Volume Distribution and Workstation Count

Cary, NC - Multi-Agency Call Volume			
Hour	Hourly %	Calls Per Hour	Call Takers Needed
0:00	1.80%	10.0	2
1:00	1.34%	7.5	1
2:00	1.18%	6.6	1
3:00	1.06%	5.9	1
4:00	0.92%	5.2	1
5:00	1.24%	6.9	1
6:00	2.17%	12.1	2
7:00	3.31%	18.4	3
8:00	4.67%	26.0	3
9:00	5.45%	30.4	3
10:00	6.31%	35.2	4



Cary, NC - Multi-Agency Call Volume			
Hour	Hourly %	Calls Per Hour	Call Takers Needed
11:00	6.29%	35.1	4
12:00	6.30%	35.1	4
13:00	6.60%	36.8	4
14:00	6.70%	37.3	4
15:00	6.90%	38.4	4
16:00	6.56%	36.5	4
17:00	6.49%	36.1	4
18:00	5.78%	32.2	4
19:00	4.77%	26.6	3
20:00	4.29%	23.9	3
21:00	4.43%	24.7	3
22:00	3.00%	16.7	3
23:00	2.42%	13.5	2
Average	100.00%	557.21	2.83

Note, there are two issues in using the industry standard Erlang C calculator tool. First, the Erlang-C calculator will never recommend less than two call-takers. The NENA and APCO staffing best practice rule indicates that no dispatch center should go below two employees on duty at any time to avoid being immediately overwhelmed, and to allow for provision of pre-arrival instructions and required staff breaks. That said, when looking at the slow hours (midnight shift) it is hard to recommend two call-takers when the incoming call volume is less than 10 calls and there are three other telecommunicators in the room monitoring the radio channels. **FE/Kimball** recommends that management review the workload during these slow hours when determining final staff and scheduling for the overnight shift. For this report there is only one call-taker needed during these anticipated slow hours. Second, the Erlang-C calculator is not designed to use multiple performance goals, e.g., 90% of 9-1-1 calls answered in 10 second or less and then a separate goal answering time for incoming ten-digit/non-emergency calls.

The following is an overview/summation of the **FE/Kimball** findings in two key areas: call taking and EMS dispatch support. For call-taker staffing, the addition of two FTEs will meet the anticipated call taking requirements for the increased workload anticipated to service Apex and Morrisville **FE/Kimball** does recommend; however, the addition of five Shift Supervisor positions. The two call-taker and five Supervisor FTEs is the expansion necessary to accommodate the total projected workload.



For consideration, with an expansion in the number of call-takers and dedicated supervision, the Fire dispatcher call-taking responsibilities will be reduced significantly allowing that position to absorb the EMS dispatch/monitoring currently provided Tuesday through Friday from 14:00 to 19:00 hours. Consideration may also be given to maintaining this assigned position to provide tactical assistance to the Fire dispatch position and overflow call-taking support during surges in workload. Table 3 also indicates the slowest hour of the day is estimated to be 04:00 hours (4:00 a.m.) and 15:00 hours (3:00 p.m.) is the busiest hour of the day (shaded in pink). This table provides upper and lower call volume from which staffing projections can be estimated. When looking at scheduling on a more granular level, determining the busiest and slowest days of the week and hour of those days allows the PSAP manager to staff shifts more efficiently based on actual workload.

For the purposes of this preliminary staffing estimate, the average number of workstations that need to be covered is used. In this case, the average number of call-taker positions needed to manage the incoming call volume is 2.83 call-takers. Since call volume is not evenly distributed around the 24-hour clock, some hours of the day will require no more than one call-taking positions and others will require four positions.

4.1 Dispatching

The next step in estimating staffing is based on the number of dispatch positions needed. Currently, there is not a nationally recognized calculation/formula to more accurately determine the number of dispatchers needed based on workload. However, radio traffic/usage studies can be conducted to determine the level of use or available airtime of a talkgroup or channel. This type of study can assist a PSAP in determining the number of channels needed to support operations but does not directly provide the number of dispatchers needed to staff the required talkgroups or channels.

As mentioned above, there is currently no scientific formula that calculates the number of needed dispatch positions based on the number of incidents or CAD events. However, this information is collected and reviewed along with the other types of criteria listed in Tables 4, 5 and 6 when estimating dispatch workstation numbers. Table 4 lists CAD events by Town, by year along with totals for all three towns per year. Tables 5 and 6 provide that same information for Fire and Law events respectively.



Table 4 - CAD Events

PSAP	Total CAD Events			
	2014	2015	2016	Average over three
Apex	15,216	16,299	17,204	16,240
Cary	153,664	171,933	157,702	161,100
Morrisville	8,414	9,044	9,937	9,132
Total	177,294	197,276	184,843	186,472

Table 5 - Fire Events

PSAP	Fire Events ⁹			
	2014	2015	2016	Average
Apex	2,677	2,786	2,903	2,789
Cary	9,240	10,122	10,693	10,018
Morrisville	1,962	2,220	2,263	2,148
Total	13,879	15,128	15,859	14,955

Table 6 - Law Events

PSAP	Law Events			
	2014	2015	2016	Average
Apex	12,539	13,513	14,301	13,451
Cary	135,120	151,392	136,070	140,861
Morrisville	6,452	6,824	7,674	6,983
Total	154,111	171,729	158,045	161,295

To maximize the efficiencies gained by combining the dispatch of various agencies, each existing dispatch position must be reviewed to see if combining the additional agencies on to the same primary dispatch talkgroup makes sense. If a single primary dispatch talkgroup is not feasible, then reducing the number of primary dispatch talkgroups to the lowest number possible is ultimately the best scenario.

It is not a recommended best practice to assign additional tasks to primary dispatchers other than dispatching events, so they are available and ready as soon as a new event arrives and are ready for dispatch or when a field unit has a radio message for the

⁹ Apex and Morrisville could not split out EMS events, so they are included within the fire statistics.



dispatcher. This is completed by thoroughly reviewing and taking into consideration the following:

- Current radio platforms in use by each user agency - Clearly, agencies that use different radio platforms cannot share talkgroups or channels without one agency moving to a new platform and incurring the cost of doing so. This is not an issue with this project since all participating agencies utilize the same radio system. However, there may be some additional subscriber radio programming costs for Morrisville Police Department to make their programming compatible with current Cary PD multi-key ADP encryption on all talkgroups as required by Cary.
- Geography - when considering combining agencies onto the same primary dispatch talkgroup, thought must be given to whether the combination makes sense from a geographical and radio coverage perspective. Agencies that share geographical borders often already assist each other on a routine basis. Therefore, combining talkgroups would be beneficial and potentially more efficient for the communications center and provide a higher level of situational awareness for the participating agencies. Note that Cary plans to have one Fire dispatch talkgroup and two separate LE talkgroups and dispatchers during busy hours. Cary does not use 10 codes and Morrisville must plan to use plan English.
- Assignment of multiple primary dispatch talkgroups - It is a recommended best practice to not assign multiple primary dispatch talkgroups to a single dispatcher. Sooner or later there will be two emergencies on each talkgroup requiring immediate attention and action of that single dispatcher and simply put, that is not possible for one person. Note that Cary will have a separate dispatch for each dispatch talkgroup.
- Number of field personnel or agencies tracked by each dispatcher - If a fire dispatcher is responsible for only a small number of field units, then combining talkgroups may offer the opportunity to reduce the number of personnel, create a more efficient call flow process in the PSAP and improve field communications by having those agencies that commonly work together on the same talkgroup.
- The use of current technology - Technology such as mobile data and AVL, should be used to help reduce radio traffic.
- Tactical or operational talkgroups and channels - The use of tactical or operational talkgroups and channels is common in fire communications to properly manage event communications, operations and incident management. A dispatcher should be assigned to monitor and support field personnel during active multi-unit incidents.



Table 7 illustrates the number and type of physical workstations and operational assignments needed for the recommended multi-agency center and backup site. The minimum number of required positions is seven, as shown in Table 7.

Table 7 - Workstation Distribution

Positions	
#	Position Type
1	Supervisor/Police 2
2	Police 1 Dispatcher
3	Fire/EMS Dispatcher
4	Call-Taker 1
5	Call-Taker 2
6	Call-Taker 3
7	Call-Taker 4
8	Overflow/Training

It is important to understand that the above workstation distribution table is conceptual. For example, our initial recommendation was for Supervisor positions not assigned to primary dispatch or call-taking duties and a single primary dispatch talkgroup for both Cary and Morrisville PD. However, if Cary determined they wanted a working Supervisor along with separate primary talkgroups for Cary and Morrisville PD the same workstation distribution would work for either. In the Table 7 example the second option is used.

Multiple options exist for the actual configuration or operational and work distribution for the multi-agency communications center. Those options are examined during the implementation planning process and a final workflow and operational model are put in place. However, to estimate staffing needs and personnel costs, the **FE/Kimball** team developed the above model based on our knowledge and experience with multi-agency consolidated center operations.

The following explains the rationale behind the workstation configuration in Table 7:

- It is **FE/Kimball's** recommendation that all positions should be equipped with the same critical technology such as CAD, 9-1-1 answering equipment and radio dispatch consoles, if economically feasible. This would allow any communications center function, call-taking or dispatching, to be conducted at any position in the center. This allows decision makers to easily change operational assignments as needed (e.g., the four call-taker and three dispatcher positions recommendation could easily be changed to three call-takers and four dispatchers if needed).



- Table 7 above, shows four call-taker workstations during the busiest time of the day. Based on **FE/Kimball's** experience during significant events, incoming call volumes spike, so any dispatchers assigned to positions who are not currently operating an incident can be used as back-up call-takers and assist in answering calls. When necessary, but as the last resort, the same can be done at the supervisor's position.

All staff would be cross-trained for all job functions. While daily job function assignments would change, any employee could be utilized at any position. This methodology ensures a higher level of efficiency and lower overtime costs. The ability to cross train all staff is a benefit of a PSAP of this size. As PSAPs grow and become more complex there is a need to split job functions by specialty; dispatcher and call-taker. While this structure works well, it does add a layer of complexity to scheduling and training.

Currently the primary center has the required room, positions and equipment necessary to function within its intended purpose; however, it has no additional positions that can be used for overflow or training activities without the need to expand the number of positions and installed equipment. Although some positions may be available at various hours of the day, during the peak times of anticipated activity all positions will be in use, such as weather and critical incidents. Another two to three positions may be a future consideration understanding that an increase in positions would also be needed in the backup center. This would most certainly have to be a consideration as the existing participating towns and agencies continue to grow or if additional departments become interested in participating.

4.2 Personnel Estimates

The staffing needs of a 24/7 public safety operation require constant monitoring of the work load and staffing assignments to maximize coverage across all shifts. It is rare that a set number of staff is on duty at any given time. The work hours and assigned positions per shift are based on need, skill sets, experience and call volume. The center management and supervisory staff are responsible for monitoring these factors and assigning staff as such.

Tables 8, 9, and 10 depict current Town of Cary minimum staffing, optimal staffing, and current PSAP staffing.?



Table 8 - Current Minimum Staffing

Town of Cary - Minimum Staffing				
Days	Shifts	Call Taker	Dispatcher	Total
Tue-Fri	14:00 to 19:00	1	3	4
Sat-Mon	14:00 to 19:00	1	2	3
All Days	19:00 to 14:00	1	2	3

Table 9 - Current Optimal Staffing

Town of Cary - Optimal Staffing				
Days	Shifts	Call Taker	Dispatcher	Total
Tue-Fri	14:00 to 19:00	1	3	4
Sat-Mon	14:00 to 19:00	1	2	3
All Days	19:00 to 14:00	1	2	3

Table 10 - Current Cary PSAP Staffing

Cary PSAP Staffing – Current	
Position Title	Total Number of Employees
Shift Supervisors	4
Telecommunicators	18
Total PSAP Staff	22

After determining the number of needed workstations, *FE/Kimball* uses APCO Project Responsive Efforts to Address Integral Staffing Needs (RETAINS) to determine the number of employees needed to staff the workstations. RETAINS takes the annual number of work hours per employee (2,184) and subtracts standard leave such as vacation, training, and sick time, to arrive at the total available work hours per employee.

The total number of annual work hours in this study is 1,887 hours per employee, based on the following human resources criteria provided by the Town of Cary:

- Vacation, compensation and holiday time - 170.7 hours
- Sick - 68.1 hours
- Training - 57.7 hours
- Personal leave - 0 hours
- Military/FMLA leave - 0 hours (included with sick)



- Other (Court) - .3 hours
- Lunch and breaks - 0 hours

We based the parameters used for this study on personnel statistics provided by the Town of Cary who will manage and operate the multi-agency communications center.

The final number of employees needed to cover call-taking functions is added to the number needed for dispatch functions to arrive at the total number of telecommunicator staff.

Table 11 provides an estimated personnel count for the multi-agency communications center, adding the additional agencies based on the estimates and assumptions included in the prior sections.

Table 11 - Cary PSAP Staffing - Option 1

Cary PSAP Staffing - Option 1	
Position Title	Total Number of Employees
Shift Supervisors	5
Telecommunicators	22
Total PSAP Staff	27

The above model assumes the following:

- Dedicated Shift Supervisors who would not routinely be tasked with any call taking and dispatching responsibilities.
- Morrisville PD will utilize the same primary dispatch talkgroup as the Cary PD. If Morrisville requires their own dedicated dispatch talkgroup, then our recommendation would be to add a dedicated dispatch position. If that is the case, an additional five employees would be needed to staff that position.
- The model assumes that the Apex FD and Morrisville FD will utilize the same primary dispatch talkgroup as the Cary FD.

Based on Erlang C calculations and the RETAINS formula, the minimum projected communications staff needed in the multi-agency PSAP is 29. We calculated this minimum projection, using the reported 9-1-1 and administrative/ non-emergency call volume. It is important to remember these positions are listed here more as functions and not necessarily as employee trained skills (e.g., call-taker and PD dispatcher). Cross training in both call-taking and dispatching would be the goal for all employees.



Table 12 - Recommended Multi-Agency PSAP Staffing by Hour - Option 1

Cary, NC - Multi-Agency Call Volume						
Hour	Hourly %	Calls Per Hour	Call Takers Needed	Dispatchers	Supervisors	Total Positions
0:00	1.80%	10.0	2	2	1	5
1:00	1.34%	7.5	1	2	1	4
2:00	1.18%	6.6	1	2	1	4
3:00	1.06%	5.9	1	2	1	4
4:00	0.92%	5.2	1	2	1	4
5:00	1.24%	6.9	1	2	1	4
6:00	2.17%	12.1	2	2	1	5
7:00	3.31%	18.4	3	2	1	6
8:00	4.67%	26.0	3	2	1	6
9:00	5.45%	30.4	3	2	1	6
10:00	6.31%	35.2	4	2	1	7
11:00	6.29%	35.1	4	2	1	7
12:00	6.30%	35.1	4	2	1	7
13:00	6.60%	36.8	4	2	1	7
14:00	6.70%	37.3	4	2	1	7
15:00	6.90%	38.4	4	2	1	7
16:00	6.56%	36.5	4	2	1	7
17:00	6.49%	36.1	4	2	1	7
18:00	5.78%	32.2	4	2	1	7
19:00	4.77%	26.6	3	2	1	6
20:00	4.29%	23.9	3	2	1	6
21:00	4.43%	24.7	3	2	1	6
22:00	3.00%	16.7	3	2	1	6
23:00	2.42%	13.5	2	2	1	5
Average	100.00%	557.21	2.83	2.00	1.00	5.83

Table 13 - Cary PSAP Staffing - Option 2

Cary PSAP Staffing - Option 2	
Position Title	Total Number of Employees
Shift Supervisors	4
Telecommunicators	23
Total PSAP Staff	27



The model above assumes the following:

- Working Shift Supervisors who would be tasked with call taking and dispatching responsibilities. In this model they would be the primary dispatcher for the 2nd Police talkgroup.
- Morrisville PD will utilize their own primary dispatch talkgroup.
- The model assumes that the Apex FD and Morrisville FD will utilize the same primary dispatch talkgroup as the Cary FD.

Table 14 - Recommended Multi-Agency PSAP Staffing by Hour - Option 2

Cary, NC - Multi-Agency Call Volume					
Hour	Hourly %	Calls Per Hour	Call Takers Needed	Supervisor / Dispatchers Needed	Total Positions
0:00	1.80%	10.0	2	3	5
1:00	1.34%	7.5	1	3	4
2:00	1.18%	6.6	1	3	4
3:00	1.06%	5.9	1	3	4
4:00	0.92%	5.2	1	3	4
5:00	1.24%	6.9	1	3	4
6:00	2.17%	12.1	2	3	5
7:00	3.31%	18.4	3	3	6
8:00	4.67%	26.0	3	3	6
9:00	5.45%	30.4	3	3	6
10:00	6.31%	35.2	4	3	7
11:00	6.29%	35.1	4	3	7
12:00	6.30%	35.1	4	3	7
13:00	6.60%	36.8	4	3	7
14:00	6.70%	37.3	4	3	7
15:00	6.90%	38.4	4	3	7
16:00	6.56%	36.5	4	3	7
17:00	6.49%	36.1	4	3	7
18:00	5.78%	32.2	4	3	7
19:00	4.77%	26.6	3	3	6
20:00	4.29%	23.9	3	3	6
21:00	4.43%	24.7	3	3	6



Cary, NC - Multi-Agency Call Volume					
Hour	Hourly %	Calls Per Hour	Call Takers Needed	Supervisor / Dispatchers Needed	Total Positions
22:00	3.00%	16.7	3	3	6
23:00	2.42%	13.5	2	3	5
Average	100.00%	557.21	2.83	3.00	5.83

Table 15 - Cary PSAP Staffing - Option 3

Cary PSAP Staffing - Option 3	
Position Title	Total Number of Employees
Shift Supervisors	5
Telecommunicators	27
Total PSAP Staff	32

The model above assumes the following:

- Dedicated Shift Supervisors who would not routinely be tasked with any call taking and dispatching responsibilities.
- Morrisville PD will utilize their own primary dispatch talkgroup and have their own dedicated dispatcher.
- The model assumes that the Apex FD and Morrisville FD will utilize the same primary dispatch talkgroup as the Cary FD.

Table 16 - Recommended Multi-Agency PSAP Staffing by Hour - Option 3

Cary, NC - Multi-Agency Call Volume						
Hour	Hourly %	Calls Per Hour	Call Takers Needed	Dispatchers	Supervisors	Total Positions
0:00	1.80%	10.0	2	3	1	6
1:00	1.34%	7.5	1	3	1	5
2:00	1.18%	6.6	1	3	1	5
3:00	1.06%	5.9	1	3	1	5
4:00	0.92%	5.2	1	3	1	5



Cary, NC - Multi-Agency Call Volume						
Hour	Hourly %	Calls Per Hour	Call Takers Needed	Dispatchers	Supervisors	Total Positions
5:00	1.24%	6.9	1	3	1	5
6:00	2.17%	12.1	2	3	1	6
7:00	3.31%	18.4	3	3	1	7
8:00	4.67%	26.0	3	3	1	7
9:00	5.45%	30.4	3	3	1	7
10:00	6.31%	35.2	4	3	1	8
11:00	6.29%	35.1	4	3	1	8
12:00	6.30%	35.1	4	3	1	8
13:00	6.60%	36.8	4	3	1	8
14:00	6.70%	37.3	4	3	1	8
15:00	6.90%	38.4	4	3	1	8
16:00	6.56%	36.5	4	3	1	8
17:00	6.49%	36.1	4	3	1	8
18:00	5.78%	32.2	4	3	1	8
19:00	4.77%	26.6	3	3	1	7
20:00	4.29%	23.9	3	3	1	7
21:00	4.43%	24.7	3	3	1	7
22:00	3.00%	16.7	3	3	1	7
23:00	2.42%	13.5	2	3	1	6
Average	100.00%	557.21	2.83	3.00	1.00	6.83

Note that these projections do not include administrative and any required support/maintenance positions, such as, but not limited to, training, QA, CAD, and radio. While completely cross-trained telecommunicators are desired, projected minimum certified staff is provided as guidance toward meeting call volume and dispatching needs.

The staffing projections represent the number of full time equivalent (FTE) employees needed to staff, at a minimum, two call-taking positions, two dispatch positions and one supervisor position during the slower periods of the day. Additional FTE staff is projected for the other positions needed during the higher call volume periods of the day; during the busier times of the day, four call-taking positions, three dispatch positions and one supervisor position will need to be staffed. A re-evaluation of available statistical call volume and data should be performed every three to six months during the planning and implementation phases of a business model change project to ensure accuracy in staffing projections.



4.3 Staffing Turnover

ECCs who experience regular annual turnover of employees should use a staffing adjustment for turnover when estimating the number of authorized staff needed. This applies to both coverage and volume influenced positions; a dispatch position would be considered a coverage position while a call taker position would be a volume influenced position.

RETAINS recommends that a five-year average of historical turnover data be used when estimating authorized staffing and considering or planning for turnover. The Town of Cary provided data for the past five years; 2013 through 2017. Their turnover rate is lower than the national average and during this time range calculated at rate of 8.69 %. The national average is estimated at approximately 15.5%.

Table 17 - Cary PSAP Staffing with Turnover - Option 1

Cary PSAP Staffing - Option 1 & 2	
Position Title	Total Number of Employees
Shift Supervisors	5
Telecommunicators	22
Total PSAP Staff	27
Turnover Factor	2
Total - Including Turnover	29

Table 18 – Cary PSAP Staffing with Turnover – Option 2

Cary PSAP Staffing - Option 2	
Position Title	Total Number of Employees
Shift Supervisors	4
Telecommunicators	23
Total PSAP Staff	27
Turnover Factor	2
Total - Including Turnover	29



Table 19 - Cary PSAP Staffing with Turnover - Option 3

Cary PSAP Staffing - Option 3	
Position Title	Total Number of Employees
Shift Supervisors	5
Telecommunicators	27
Total PSAP Staff	32
Turnover Factor	2
Total - Including Turnover	34

4.4 Salary Ranges

Table 20 depicts the number of authorized and actual employees for the Cary PSAP:

Table 20 - Current Employees

Current Employees - Cary PSAP				
PSAP	Authorized Employees - Full Time	Authorized Employees - Part Time	Actual Employees - Full Time	Actual Employees - Part Time
Shift Supervisors	4	0	4	0
Telecommunicators	18	0	18	0
Total	22	0	22	0

Table 21 depicts the current salary ranges for the Cary PSAP telecommunication employees:

Table 21 - Current Salary Ranges

Current Salary Ranges - Cary PSAP			
Position	Low - Monthly	High - Monthly	Average
Shift Supervisor	\$3,756.13	\$5,820.53	\$4,788.33
Communications Officer I, II, Senior	\$3,088.80	\$5,279.73	\$4,184.27



4.5 Job Titles

The following subsections present some sample definitions for positions typically found in a multi-agency operation comprising a fully civilian staff. Although the functions of each of the positions will be needed, it may not be necessary that a dedicated person will be needed for each position listed. This depends on workload, so for example, the training and QA positions may be combined; QA may be completed by the supervisors with training conducted by the deputy director.

4.5.1 Director or Manager

The Director or Manager has overall responsibility for providing leadership and has ultimate responsibility for all PSAP operational, technological, budgetary and administrative tasks. The director is charged with setting the direction for the PSAP, planning for future operational and technological changes and ensuring that the PSAP meets the mission set by the PSAP's oversight body. The reporting relationship for this position is determined by the type of governance chosen.

4.5.2 Deputy Director/Manager - Operations

This position reports to the Director/Manager. This Deputy Director/Manager oversees the shift supervisors, may function/fill in as the shift supervisor during the day shift or as needed. This position is responsible for assisting the Director/Manager in budget preparation, making staffing decisions, performing complaint investigations, working with agencies served by the PSAP and other operational support.

4.5.3 Technology Manager

The Technology Manager reports to the Director/Manager and oversees all technical and equipment issues concerning the PSAP's technology. This position oversees IT and geographic information support (GIS) support staff, works with vendors on maintenance and repair issues, plans for upgrades and supports the technology needs of the PSAP.

4.5.4 GIS and Technology Support

This position(s) reports to the Technology Manager and is responsible for providing GIS and/or IT support for various technology found in the PSAP. This support could be dedicated to IT, CAD, radio, telephone, logging recorder or a combination of PSAP technology.



4.5.5 Training

The Training staff is responsible for the coordination and training of all PSAP operational personnel, and for developing and interacting with Chief Technology Officers (CTOs). In addition to new-hire training, 40-hours continuing education per year per telecommunicator is typically recommended and/or required to maintain and update skills. Specialized certifications may require a minimum number of continuing education hours per year. The Training staff is responsible for certification maintenance programs and for tracking and monitoring on-the-job training.

4.5.6 Quality Assurance

The QA staff reviews calls, provides feedback on performance and manages compliance with best practices and policies. This process provides evidence needed to establish and maintain that services provided by the PSAP are of high quality and performed effectively. This position helps identify organizational and individual training deficiencies and provides plans to rectify them. The QA function is required of any agency administering pre-arrival instructions and/or pursuing accreditation through NAED¹⁰ or CALEA^{®11}. This position is typically responsible for the creation of recordings for investigations, use in court or other official proceedings.

4.5.7 Shift Supervision

To properly manage a multi-agency PSAP, a strong supervisory structure is recommended for two primary reasons; public safety best practices and operational efficiency. Although in smaller PSAPs shift supervisors are not always present for financial reasons or because sworn personnel function in this role, the PSAP in these models will be too large to operate efficiently without the presence of 24/7 supervision. In *FE/Kimball's* view, it is essential that shift supervision not be assigned to a primary call-taker or dispatch position and that shift supervisors are present on a 24/7/365 basis.

4.5.8 Telecommunicators

This position reports to the shift supervisor and is responsible for call-taking and dispatch functions.

¹⁰ National Academies of Emergency Dispatch

¹¹ Commission on Accreditation for Law Enforcement



4.5.9 Administrative Support

This position reports to the Director/Manager and is responsible for providing administrative support and managing office responsibilities.

Functions such as HR, payroll and facility maintenance are not covered within this structure. These functions are typically provided by utilizing other existing departments already in place to provide these tasks for all town employees.

4.6 Shift Supervision

Public safety best practices require 24/7 supervision. NFPA has developed codes, standards and recommended practices through a process approved by the American

National Standards Institute (ANSI). To cover this, five Supervisors will be needed to provide one supervisor on duty on a 24/7 basis. This group can be supplemented by senior telecommunicators or assistant supervisors functioning in an acting supervisory capacity.

The Department of Homeland Security, coordinating with federal, state and local governments established the National Incident Management System (NIMS). Incident Command System (ICS) falls under the Command and Management element of NIMS. The ICS represents best practices and is the standard for emergency management across the country and requires a supervisor when there are between five and ten persons performing similar functions. A manageable span of control allows supervisors to supervise and control their subordinates, while allowing for efficient communications between all parties.

While NFPA standards and ICS require dedicated supervisory personnel, there are in-house considerations as well. A multi-agency PSAP will have greater geographic boundaries and agency responsibilities and a dedicated supervisor assigned to each shift:

- Provides coordination and direction during major emergency incidents, such as severe weather or high-profile incidents
- Is available for problem solving
- Is the single point of contact for stakeholder agencies
- Is readily able to identify areas for growth among subordinate employees
- Allows for formalized development of career paths



- Documents employee performance for annual/periodic reviews
- Provides a narrower scope of supervision when implementing new policies and procedures
- Provides more supervision for diversified, complex tasks
- Ability to stay current with technological changes/advancements
- Provides guidance to new employees who have less training and experience
- Provides greater knowledge of laws, procedures, and administrative processes
- Focuses on the operations of the PSAP and not have split responsibilities with a call-taker or dispatch position
- Focuses on customer service to public, stakeholder agencies
- Allows for improved communications with management, subordinates, and stakeholder agencies
- Mentors staff daily
- Allows for operational efficiency
- Identify areas for remedial training, counseling or discipline, when appropriate
- Address issues upon occurrence, not after the fact
- Develops and sets priorities
- Allows for delegation of tasks/responsibilities

4.7 Facilities

4.7.1 Backup Facility

In the event the multi-agency communications center had to be evacuated or was rendered uninhabitable, there will be a need to maintain operations and relocate to a back-up center at another location. The Town maintains a back-up site at Cary Fire Station 6, located at 3609 Ten-Ten Road, in the Town of Cary and approximately 7 miles from the primary center.



A back-up PSAP is essential to maintaining an acceptable level of 9-1-1 call processing and emergency services dispatching. Without a back-up center, call processing and dispatching would be severely compromised if operations at the multi-agency communications center ceased for whatever reason. Evacuation and relocation of staff from the primary communications center may be caused by environmental and/or technical infrastructure failure. Failures of the 9-1-1 internal or external telecommunications, radio dispatch equipment or electrical service equipment are situations when evacuation to a back-up PSAP could be warranted.

A back-up facility should be reviewed for specific requirements by the multi-agency PSAP. It will require robust and diverse systems that share operational and functional redundancy and physical capabilities with the primary facility. The selected back-up facility can serve as a cost-effective location for off-site installation of back-up servers or database maintenance for any or all critical systems in use at the primary facility. The primary and back-up facility can provide systems redundancy for each other. It is best if the facility has sufficient hardening and redundant power/telecommunications connectivity to function in this capacity.

FE/Kimball recommends a back-up center sized to accommodate 100% capacity of a multi-agency communications center. Full capacity is the ultimate configuration but often cannot be achieved due to fiscal or space requirements. The current back-up site has eight positions installed, like the primary site.

The facility should have the ability to support a temporary short- and long-term loss of the primary facility. Short-term would be designated as 2-5 days and long-term would be considered a longer period (e.g., days, weeks, months).

With the proper connectivity between the primary and back-up, the back-up facility can augment operations at the primary facility during times of disaster or high call volume when additional call-taking and/or dispatching resources are needed. Cary has this connectivity in place via AT&T circuits.

The back-up facility should be geographically diverse for weather-related or other localized disasters and emergencies. If possible, the back-up facility should be served by alternate utilities (e.g., telephone, and power grid). The existing back-up facility is located approximately 7 miles from the primary center and it is served by a separate AT&T central office.

Costs related to supporting a back-up facility can range from minimal to expensive depending on the size, furnishings and the amount and type of technology desired. Commonly, a back-up facility does not mirror the primary PSAP in terms of space,



technology and furnishings, due to the cost involved as compared to the actual usage of a back-up facility.

While it is critical that a back-up facility exist, it can function with less technology (use of manual or paper tracking systems) and often uses furniture and chairs that are second-hand from the primary PSAP. Under these circumstances, costs to support the back-up facility are reduced. For example, the solution for 9-1-1 answering equipment is provided by using dock-able 'command post' type of technology instead of dedicated answering workstation. If a mirror of the primary PSAP is desired, then technology-related costs can be substantially higher and, at times, costprohibitive.

Other critical equipment installed at the back-up center includes 9-1-1 trunks, ALI circuits, administrative phone lines, CAD loaded on eight laptops, mobile radios, logging recorder, UPS, generator and the Town's IP network.

Both the primary and back-up centers have the required room and positions necessary to function within their intended purpose; however, neither site has much leeway to provide additional overflow operations in a stand-alone scenario without the need to expand the number of positions and installed equipment.



5. Recommendations

5.1 Non-Dispatch Tasks

A primary concern expressed by municipalities is the potential loss to the community of 24/7 access to public safety agencies. While the method of service delivery may change, the community could still have 24/7 access to public safety agencies. All 9-1-1 calls will be received by a regional center in Cary where local public safety agencies will be dispatched. Administrative calls would be processed much as they are now. Citizens can visit an agency or call phone lines dedicated to administrative calls during regular business hours. After business hours, the public will need to be redirected to Cary or Apex, as appropriate, for issues that require immediate attention or directed to appropriate voicemail for specific administrative questions or concerns.

As is commonly found in smaller PSAPs, the staff performs a variety of duties in addition to those related to the receipt and processing of 9-1-1 calls and the dispatch of field personnel. The participating agencies have non-emergency communications-related ancillary duties. Some of these duties, such as sending animal control or notifying public works, may be provided by a regional center, but many of the duties will not. How the duties that remain with each municipality are absorbed and who performs the duty is often of primary concern to those considering a regional PSAP. If additional staff must be hired within the municipality to perform these duties, then any potential cost savings realized because of the regionalization effort will be reduced. Each agency will need to evaluate these tasks and decide if they really need to be provided in the same manner as exists today or if they can be discontinued or provided in a manner that does not require after-hours staffing.

The dispatchers are all tasked answering administrative calls for police, fire, or other municipal needs, which are routed or transferred accordingly. During normal business hours, most agencies will want someone to perform the administrative duties that are currently performed by the 9-1-1 dispatcher. Clerical work, filling overtime or detail requests, permits, fleet maintenance records, lost and found, burning permits, and reports are all functions that the current staffs may perform, and are examples of duties that should not transition to a regional center 9-1-1 center.

The location and setup of the PSAPs in Cary and Apex avoid direct public access and are therefore not expected to handle walk-in requests from the public. Both are in and operated by their respective Towns' police departments. The Cary PSAP answers 9-1-1 calls directly and dispatches police and fire services, and requests dispatch for EMS from RWECC. The Apex PSAP receives transferred 9-1-1 calls for police response and all fire and EMS calls are processed and dispatched by RWECC. Apex PSAP does monitor and



support the post-broadcast portion of the fire and EMS dispatched responders. The Town of Morrisville does not have a PSAP located in the Town but receives service for 9-1-1 call answering and dispatching for police, fire and EMS from the RWECC.

The impetus of this study is to assist decision makers in determining if Cary should continue as a single PSAP or should services transition for Morrisville and Apex 9-1-1 calls to Cary - and should dispatching for Morrisville police and fire, and Apex fire transition to Cary. With this understanding, **FE/Kimball** included discussions and observations focused on what non-dispatch tasks or functions the individual PSAPs performed that may be relevant and/or impacted by a transition of 9-1-1 and dispatch services. Since the Cary PSAP is not transitioning service, and primarily performs 9-1-1 and dispatch functions, there were no identified non-dispatch activities or tasks that would require transition outside the PSAP. Discussion and observation in the Apex PSAP revealed that all support activities and tasks associated with fire and EMS dispatch services are appropriate and relevant to be handled in a PSAP. Therefore, all fire and EMS dispatch service support currently being handled by the RWECC, and by and for the Apex fire and post-broadcast EMS response would be appropriate for transition to the Cary PSAP. The non-dispatch activities or tasks performed in support of fire services in Apex are directly tied to data sharing needs within the Apex Fire Department. These data needs can be accommodated through access to CAD reports in a shared services operation. There were no other non-dispatch activities or tasks identified in the Apex PSAP. The Morrisville police and fire services are currently dispatched by the RWECC. RWECC answers 9-1-1 calls for Morrisville and dispatches the appropriate units and apparatus. There are no non-dispatch activities or tasks identified as being performed by RWECC on behalf of Morrisville. To that, Morrisville has expressed the need to have access to data and an improved coordination relationship with Cary in providing call answering and dispatching. This may lead to Cary providing more dispatch related services to Morrisville, of which any said additional services would need to be detailed in an SLA, along with how that service(s) will be provisioned.

5.2 Recommended Organizational Structure

Based on interviews with stakeholders representing the Towns of Cary, Morrisville and Apex, **FE/Kimball** recommends a service contract model of regionalization. A service contract model for the Towns allows the Cary to maintain the current PSAP support structure provided by the Town that includes the ownership, care and maintenance of the operation to include the tangible assets and the workproduct.

The Town of Apex plans to continue operating their PSAP as a secondary 9-1-1 center for police dispatching. In a service contract model all Apex 9-1-1 calls will be answered by Cary with police response calls transferred to Apex. The dispatching of Apex Fire



would transition from the RWECC to Cary, of which all aspects of planning, implementation, fees for service, appropriate level of input and control over the provision of fire dispatching for Apex Fire, remedy for issues and termination clause, must be negotiated and documented in detail in an SLA executed between the two Towns.

The Town of Morrisville has all 9-1-1 calls and dispatching for police and fire handled by RWECC. In a service contract model with Cary, all Morrisville 9-1-1 calls would be answered by Cary and all police and fire dispatching would be performed by Cary. Like an Apex/Cary agreement, Morrisville would document all aspects of planning, implementation, fees for service, an appropriate level of input and control over the provision of call taking and dispatching, remedy for issues and termination clause, must be negotiated and documented in detail in an SLA executed between the two Towns.

A service contract model will require an expansion of key areas of the Cary support structure, organization, operational methodology, technology and associated support, operational programs such as hiring, training and QA/QC. As described in the staffing projections, additional supervision and support staff will be required to scale up to meet the workload needs and the service requirements of the Towns. The hiring, training and QA/QC programs will require formality, documentation and staff to stand up, expand and support, a regional center.

A critical work effort that must be completed to enact a regional center, regardless of governance, is the review, standardization, development and/or editing of standard operating procedures/guides (SOPs/SOGs). Gathering and review of all documentation, policies, procedures and protocols to identify those that are similar and can be combined, those that differ that should be standardized, and those that are unique and must be preserved and addressed in cross-training and/or through technology such as CAD response protocols.

Accompanying this critical step is the identification of any transitioning staff and their cross-training needs, and the cross-training needs of the Cary staff. A formal structured training program will then be required to accommodate this training, which should be scheduled to take place in the weeks just prior to the transition of service.

The three Towns' support of departments such as Human Resources, Procurement/Finance and Legal, will need to engage early in contract service and organizational change to make certain all critical human resource, service description and contracts, are inclusive and meet the requirements of the three Towns.

Once decisions are made to first regionalize, and second which Town(s) will be involved, the expansion of staffs and programs can be customized to fit the need. For example, if



only Apex Fire transitions to Cary, staff expansion will not be necessary to the extent as if Morrisville police and fire transitioned as well.



6. Funding Model

The Town of Cary contracted with **FE/Kimball** to develop funding model mechanism options to accommodate the potential consolidation of the 9-1-1 call-taking and police and fire dispatching for the Towns of Cary and Morrisville, and the dispatching of fire services for the Town of Apex. The Towns, like all local governments, are the most appropriate providers of emergency response services and understand that this service comprises two distinct components - the 9-1-1 call-taking and the dispatching of service agencies.

The current 9-1-1 call-answering and eligible components of the dispatching equipment and systems are funded via 9-1-1 device surcharge distribution from the state 9-1-1 Board. The secondary PSAP in Apex is eligible for funding for 9-1-1 call answering and components of dispatch via an agreement with RWECC. Should the Town of Morrisville transition 9-1-1 call answering and dispatching for police and fire to the Town of Cary from RWECC; and should the Town of Apex transition the dispatching of fire services from RWECC, the Towns' consolidated operation will require a fair and equitable fee structure that is viable and sustainable to cover costs of operations, systems, equipment, networking and so on, beyond that which is funded by the NC9-1-1 Board. To that, **FE/Kimball** worked with the Towns' representatives to collect historical and current data, review existing documentation, statistics and budget data, and legislative and planning documents. The Towns currently cover costs for non-eligible emergency communications needs from their general budgets. This section provides options for sharing the costs associated with a potential transition of services and the ongoing operational costs of a consolidated center.

In anticipation of the impending statewide ESInet core services and NG9-1-1 applications, **FE/Kimball** recommends a budgetary planning path for the transition of PSAP services for the Towns of Morrisville (police and fire) and Apex (fire only) from RWECC to the Town of Cary. The budgeting planning is focused on identifying a funding model for one-time/temporary transition costs and for the ongoing operations and future capital improvement and life cycle of technology. This funding model must be viable and sustainable, be easy to understand, implement and use, and have the flexibility to adapt to any future change in legislation, technology and partnerships. For the one-time/temporary transition costs, **FE/Kimball** recommends identifying what are not eligible for funding under 9-1-1 surcharge distribution, then splitting these costs with Morrisville responsible for two-thirds (2/3) and Apex one-third (1/3). This split of non-eligible costs is based on the impact to the Town of Cary facility, technology and operation. Morrisville 9-1-1 calls and associated dispatching for police and fire will transition from RWECC to the Town of Cary, from one primary PSAP to another. Apex 9-1-1 calls will transition from RWECC to the Town of Cary, one primary to another; however, the current practice of



transferring Apex police calls will continue in the same manner only the transfer would come from Cary.

For the ongoing operational, future capital improvements and life cycle costs, **FE/Kimball** recommends a model that calculates a fee for calls for service based on a percentage of overall call volume by agencies. This will require calculating the volume percentages per response agency and applying a cost per call based on the type of response. The statistics to be used in the formula are the number of Calls for Service (CFS) received, the number of responses dispatched segregated by the type of response (law enforcement, fire and EMS) and the cost per call. The segregation of response types allows for municipalities to be billed based on agency specific workload.

FE/Kimball recommends a review and re-evaluation of the formulae, data and call counts, and resulting budgetary impacts after one year of use, with subsequent reviews/audits at appropriate intervals, e.g. annual or bi-annual basis.

The funding method and process is intended to be a consistent, measurable and defensible formula and process.

The Towns will need the ability to expand the use of IP-capable technology within the PSAP and the response agencies to meet the public expectation of communicating beyond voice into the world of text, data exchange, automatic crash notifications, CAD to CAD, trauma reporting, pictures and video, and more. North Carolina General Statute 143B-1417 dictates that the NC9-1-1 Board must allocate 10% of the collective device surcharge to statewide 9-1-1 system or the ESInet. This fund is anticipated to cover much of the costs associated with the planned statewide ESInet as part of the device surcharge management and distribution at the state level; however, there will be connectivity (last mile) and internal PSAP costs that can be anticipated at the local level that involve developing capabilities necessary for the Towns to meet the needs and expectations of the public. The public expectation focuses on application capabilities and the need to protect the data received and transmitted in the ever-changing data rich environment. Cyber security costs will be a critical issue for which the devices, methods, protocols and policies will have associated costs beyond what is provided in the statewide ESInet inclusive core services. These costs are yet to be fully defined by the NC9-1-1 Board.

The funding model is formula based with tabulating calls for service as the core component and based on an estimated cost per call that is quantified by calculating the non-eligible cost of the staff (salaries, benefits, and training), the systems acquisition and recurring costs, and the facility cost (utilities, space, maintenance).

In addition to the reported costs to provide service by the public safety agencies in the Towns, data from the FCC Annual Report to Congress on State Collection and



Distribution of 9-1-1 Fees (FCC Report) was considered as a documented base point for determining a cost per call. The FCC Report contained reported data from the State of North Carolina that indicated an average cost per call (per capita) of \$11.83 statewide. Utilizing a growth rate percentage of 1.14 percent extends the cost per call for local PSAPs in North Carolina to \$13.48. Note that the actual population increase projections for the Raleigh-Wake area are exceeding all projections made in the past decade. To that, monitoring the cost per call and the level of state funding provided to the locals in support of NG9-1-1 will be critical and requires the Towns to audit their funding needs frequently.

This model calculates a fee for calls for service based on a percentage of overall call volume by agencies serving each Town. For example, police and fire for Morrisville and fire only for Apex. This is based on the 9-1-1 call count validated by the CAD entries and applied based on the types of response, meaning number of law enforcement and fire responses. The larger volume of calls for service within the Towns are law enforcement and the lowest volume are fire. The actual effort to dispatch these services are greater for fire than for law enforcement due to the number of units (apparatus and equipment).

The formula will require calculating the volume percentages per response agency and applying a cost per call based on the type of response. This method will result in different fees based on the service response type - e.g. law, fire. This method is flexible and will follow and fluctuate with response trends. This model will allow an accurate tracking of effort for call taking/processing and dispatching while using a flexible rate plan based on the cost per call of \$13.48 and fluctuations in use of the 9-1-1 system overall to include response agencies.

Funding template content and formula description

The following includes a description of the statistics to be used in the formula, the funding formula, and directions for use of the template.

Statistics

The statistics to be used in the formula are the number of Calls for Service (CFS) received, the number of responses dispatched segregated by the type of response (law enforcement, fire), and the cost per call. For the purposes of this document, the cost per call of \$13.48 will be used for demonstration. As previously noted, this figure was derived from the FCC 8th Annual 9-1-1 Fee Report and aggregated by a 1.14 growth factor.

The segregation of response types allows the Towns of Morrisville and Apex to be billed based on agency specific workload. To create a fair and equitable approach, a response (dispatch) factor is applied based on the known or anticipated dispatched calls for service



by agency type. In Cary, Morrisville and Apex, and across the country, the volume of law enforcement response calls for service account for approximately 60% of the overall dispatches and fire 15% (EMS responses represent approximately 25%, dispatched by RWECC) - this does not include the overlapping statistics of multi-agency/multi-jurisdictional responses. To factor in the effort to dispatch responses, a response factor of .60 for law enforcement and .15 for fire, is added to the cost per call of \$13.48. This increases the cost per call for answering and dispatch services to \$21.56 for law enforcement calls and \$15.50 for fire. The differing costs per call are intended to capture the cost to process 9-1-1 calls and the cost associated with dispatching responders to these calls. While the law enforcement calls for service costs are driven by the volume of calls, the fire calls for service costs are driven by the cost to respond. Note that a fiscal balance is realized in the cost of response borne by the municipalities through the procurement, maintenance, equipping and staffing of the vehicles and apparatus. Fire response vehicles cost overall about 75% more per hour per run than law enforcement response vehicles.

Note that the cost per call for the Apex Police partial call processing that must occur is yet to be determined and will require the two Towns to come to an agreement on how best to define and share the cost. RWECC does not specifically charge the Town of Apex for the partial call process and transfer of law enforcement calls. There is a cost associated that is most likely included in a total pay for service model. In the transition of primary call-taking from RWECC to Cary, there is an opportunity to define and share the cost. Unlike full service, the Town of Apex Police calls must be processed to a point where the call must be transferred to Apex and handed off (disconnected) or transferred and an open line maintained with Apex while a coordinated multi-agency response is developed. The range of process results makes it difficult to clearly divide costs. **FE/Kimball** recommends negotiating an agreeable percentage of 30%-50% of the overall cost per call so that Apex statistics can be used in the recommended funding template.

The following formula description and process steps are offered as a base/starting point for the Towns. The tool is designed to allow the participants to be able to adapt different statistical data and factors to meet their needs. This original state, formula and factors are provided as a defensible base as developed by **FE/Kimball**. Any alterations to this tool and formula are the property of the Towns.

Funding Formula Steps

Step 1: Total No. of CFS All Agencies (for fiscal period - e.g. annually, monthly, quarterly)

Step 2: Percentage of Total CFS by Agency



Step 3: Cost of CFS by Agencies using the cost per call and dispatch service of \$21.56 per law enforcement call and \$15.50 per fire call.

Step 4: Total Cost per CFS All Agencies.

Step 5: Multiply Each Agency's Percentage by the Total Cost of CFS All Agencies

Results are the fee for service for each agency for the pre-determined fiscal period, e.g. annual, quarterly, monthly.

Note that the percentage of workload/call volume, cost per call for service processing and other factors are easily adjusted within the formula based on the decisions made and the agreement executed between the Towns.

Using the Template

Exhibit 2 is the funding template in Excel spreadsheet form, complete with formulas and appropriate formatting. The template can be expanded to introduce multiple agencies and the calculation factors and formulas can be adjusted to meet the Towns' needs. To use the template, insert number of calls for service for each agency in the column labeled CFS by Agency (date). All other formulas and cells will auto-populate to show total calls for service, cost per call per agency, cost per response, percentage of calls, fee per agency, and total fee for collection.

Audit and Review Recommendation

FE/Kimball recommends a review and re-evaluation of the formulae, data and call counts, and resulting budgetary impacts after one year of use, with subsequent reviews/audits at appropriate intervals, e.g. annual or bi-annual basis. This review provides a method and process to determine if the funding mechanism is meeting the needs of the agencies and system users and allows for adjustments to be made based on the findings.



Exhibit 1 - Estimated Technology Costs

Table E.1.1 - Estimated Technology Costs per Agency and Type

ESTIMATED TECHNOLOGY COSTS					
TECHNOLOGY SYSTEMS	Agency	#	Per Cost	Total Cost	Annual Maintenance
Computer Aided Dispatch (CAD)					
CAD Status Resource Monitor - Apex	Apex	16	\$1,500	\$24,000	\$3,840
CAD Status Resource Monitor - Morrisville	Morrisville	5	\$1,500	\$7,500	\$1,200
OpCenter for CAD - Apex (Optional-Site License)	Apex	1	\$3,000	\$3,000	\$480
OpCenter for CAD - Morrisville (Optional-Site License)	Morrisville	1	\$3,000	\$3,000	\$480
Interface to Morrisville PD LERMS	Morrisville	1	\$7,500	\$7,500	\$1,200
CAD Training - Multi-Agency Configuration	Cary	1	\$2,560	\$2,560	\$ -
Sub-Total				\$47,560	\$7,200
Mobile Data Computers (MDCs)					
Apex FD MDC Client	Apex	15	\$900	\$13,500	\$2,160
Morrisville FD MDC Client	Morrisville	15	\$900	\$13,500	\$2,160
Morrisville PD MDC Client	Morrisville	50	\$900	\$45,000	\$7,200
Apex FD Superior Services	Apex	1	\$3,500	\$3,500	\$ -
Morrisville FD Superior Services	Morrisville	1	\$3,500	\$3,500	\$ -
Morrisville PD Superior Services	Morrisville	1	\$9,000	\$9,000	\$ -
Apex FD MDC Hardware	Apex	15	\$1,970	\$29,550	\$ -
Cary MDS Upgrade - Web Version	Cary	1	\$10,000	\$10,000	\$ -
Sub-Total				\$127,550	\$11,520
9-1-1 Telephony					
Programming of Cary 9-1-1 Answering Positions	Cary	1	\$2,500	\$2,500	\$ -
Sub-Total				\$2,500	
Radio System					
Apex FD Subscriber Units - Reprogram	Apex	95	\$100	\$9,500	\$ -
Morrisville PD Subscriber Units - Reprogram	Morrisville	108	\$100	\$10,800	\$ -
Apex FD Back-up Radio Solution	Apex	1	\$10,000	\$10,000	\$ -
Morrisville FD Back-up Radio Solution	Morrisville	1	\$5,000	\$5,000	\$ -
Morrisville PD Back-Radio Solution	Morrisville	1	\$5,000	\$5,000	\$ -
Cary Radio Console Programming	Cary	1	\$5,000	\$5,000	\$ -
Install New Morrisville PD Repeater at Back-up Center	Morrisville	1	\$20,000	\$20,000	\$ -
Sub-Total				\$65,300	
Fire Station Alerting					
Apex Fire Department Stations	Apex	5	\$20,000	\$100,000	\$ -
Morrisville Fire Department Stations	Morrisville	3	\$20,000	\$60,000	\$ -



ESTIMATED TECHNOLOGY COSTS					
TECHNOLOGY SYSTEMS	Agency	#	Per Cost	Total Cost	Annual Maintenance
Sub-Total				\$160,000	
Logging Recorder					
Reconfigure Recorder for new Talkgroups	Apex	1	\$3,000	\$3,000	\$ -
Reconfigure Recorder at Back-up Center	Cary	1	\$20,000	\$20,000	\$ -
Sub-Total				\$23,000	
Network Connectivity					
Cary Connection and Firewall	Cary	1	\$16,000	\$16,000	\$ -
Apex 3rd Party Fiber Connection	Apex	1	\$8,400	\$8,400	\$ -
Apex Firewall/Hardware for Connection	Apex	5	\$3,000	\$3,000	\$ -
Morrisville 3rd Party Fiber Connection	Morrisville	1	\$8,400	\$8,400	\$ -
Sub-Total				\$35,800	

Table E.1.2 Estimated Cost per Technology

Cost per Technology	
Computer Aided Dispatch	\$47,560
Mobile Data Computers	\$127,550
911 Telephone	\$2,500
Radio System	\$65,300
Fire Station Alerting	\$160,000
Logging Recorder	\$23,000
Network Connectivity	\$35,800
Support & Maintenance	\$37,440
Total	\$461,710

Table E.1.3 – Estimated Technology Cost per Town

Cost per Town		
Town	Cost	Maintenance
Apex	\$207,450.00	\$6,480.00
Cary	\$56,060.00	\$ -
Morrisville	\$198,200.00	\$12,240.00
Total	\$461,710.00	\$18,720.00



Exhibit 2 - Funding Model Template

See the following file provided separately and included here byreference:

Exhibit 2 – Funding Model Template.pdf

