

King County 911 Strategic Plan

Task Force Reports

For Leadership Group Discussion: September 29, 2017

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Background

In 2016, King County initiated a strategic planning process for the King County E911 system. The Strategic Planning process is scheduled to occur through 2017, with final recommendations to be delivered to the King County Council in December. The planning process involves three task forces which are Technology and Operations, Finance, and Governance.

The formal task designated to the Governance Task Force from the scoping process was to define an ongoing decision-making or governance structure for the Regional E-911 System, including organization chart; decision structure; accountability; responsibility; and conflict resolution process.

Auditor's Report

The King County Auditor's report on the E-911 system was one of the catalysts for the scoping and strategic planning process. Of the report's main findings, a governance system that provided formal, clear, and transparent decision making structure was needed.

The Governance Task Force reviewed the findings and recommendations of the Auditor report and incorporated those into their workplan.

Issue Brief

The first meetings of the Task Force allowed members to identify issues with the current system. This resulted in an issue brief that established the basis for the work of the Task Force and provided guidance for future meetings.

Case Studies

The initial work of the Task Force included a review of other regional E-911 governance structures to gain a better understanding of how other agencies were structured, how PSAPs were represented, how decisions were made, if authority was delegated or advisory, and how operations and capital were funded. These case studies were used to determine if best practices existed and what experiences of other jurisdictions could be applied to improve E-911 governance in King County. A set of questions and evaluation criteria were used for each jurisdiction. E-911 structures that were studied included the Interim Advisory Group for King County E-911; Otsego County, New York; Palm Beach County, Florida; Tarrant County 911 District, Texas; and Ramsey County, Minnesota. All the 911 systems interviewed had similarities in their governance structures. In all cases authority was delegated by the state to counties or a regional authority and representation by PSAPS or local jurisdictions was advisory to the county or regional system. There was also a variance in state involvement with 911 systems, ranging from Palm Beach which had a high level of state oversight and control, to the Tarrant County District, which is a regional partnership with little state oversight.

In addition, the Task Force engaged in a discussion of authorities and voting structures of other regional governance structures in the Puget Sound region not related to 911. Those were the Puget Sound Regional Council, the King County Growth Management Council, the Regional Communications Board (PSERN), and the Emergency Medical System Advisory Committee.

The full review of Case Studies is included in the appendix to this report.

Scoping

The scoping process developed a list of questions and goals to be addressed by the Governance Task Force. These were intended to be a guide for the Task Force, and to ensure that the group addressed certain key issues. The definition of the Regional King County E-911 system, Governance goals, and questions from scoping are as follows:

System Definition:

The Regional E911 System is operated by the E-911 Program Office in the County's Department of Information Technology in cooperation with twelve independent Public Safety Answering Points (PSAPs), with the E911 Program Office routing requests and the PSAPs interrogating callers and dispatching services. The Regional E911 System is funded by excise taxes levied on landline, wireless and voice-over-internet phones.

Governance Goals:

- Equity – especially regional equity
- Transparency
- Project Management Principles(e.g., Lean and Lean/Six Sigma Management)
- Collaboration
- Predictability
- Fiscal responsibility
- Financial sustainability
- Cost effective
- Performance metrics
- Continuous improvement
- Public accountability
- Consensus

Questions and Issues:

- What are others doing for governance of regional E-911 systems with multiple operating groups?
- What is the current governance structure (organization chart; decision structure oversight; accountability; responsibility, conflict resolution process)?
- What are the governance lessons from the 2015 King County Auditor's report on E-911 operations?
- What is the definition of the King County Regional E-911 System?
- What is the management structure for the King County Regional E-911 System, in terms of authority, oversight, operations, accountability, responsibility, and performance monitoring?
- What is the major decision-making structure for the King County Regional E-911 System, including process management, research, input, and authority?
- What is the conflict resolution process for the King County Regional E-911 System?
- What is the stakeholder engagement structure for the King County Regional E-911 System, including input into decisions, reporting, and performance monitoring?

Meetings

The governance task force held 10 meetings over the course of 10 months.

- **Meeting 1** – *Review of Auditor’s report, issue identification, discussion of current standard practices, review of some existing statutory authorities*
- **Meeting 2** – *Review of issue brief document, update on finance, review of a preliminary list of governance models, discussion on aspects of models to research*
- **Meeting 3** – *Review of governance models research findings, questions and discussion*
- **Meeting 4** – *Review of drafted principles, discussion on membership and voting*
- **Meeting 5** – *Continued discussion on principles, membership, voting*
- **Meeting 6** – *Continued discussion on principles, membership, voting, and subjects of authority.*
- **Meeting 7** – *Revisit Voting Structure and Authority*
- **Meeting 8** – *Revisit Voting Structure and Authority*
- **Meeting 9** – *Revisit Voting Structure and Authority, revisit old principles and discuss new principles.*
- **Meeting 10** – *Revisit subjects and structure, including committees.*

Principles

Over the course of several meetings the Task Force discussed, developed and agreed to a set of principles that a recommended governance structure would need to embody. These principles were intended to amplify the goals established in the scoping process.

- Every PSAP has a seat at the table
- A form of proportionality shall be used for voting purposes
- A form of consensus decision making shall be used
- The structure must continue to function if the system changes
- The Governing Board will make informed and timely decisions for the good of the regional system
- The Governing Board will inform and advise on the regional 911 system
- The Governing Board will be fully transparent in decision making
- Governing Board members should advocate at all levels to implement best practices and appropriate resources in the public and private sectors
- The Governing Board shall maintain a collaborative approach among all jurisdictions and project partners, including open and regular communication
- The Governing Board shall review and consider the results of outreach to diverse communities that are served by the Regional King County E-911 system
- The Governing Board shall continue to seek opportunities for improvement

Authority:

The Governing Board of the King County E-911 system shall inform and advise the King County E-911 Program Office, the King County Executive, and the King County Council on the regional King County E-911 system.

Voting:

The Governing Board shall strive to reach consensus on all issues and any recommendations to the King County Program Office, the King County Executive and the King County Council. Consensus is assumed unless a member of the board that is present at the meeting asks for a formal vote. A call for a vote must be seconded by another board member for the vote to proceed.

If a board member who is present at the meeting requests a vote, and that vote is seconded by another board member, the following voting procedure shall apply.

A quorum of the board must be present at the meeting. A quorum is defined as 50% plus one of the total board membership.

A majority action of the Governing Board requires the yes votes of 40% of board members present and voting that also represent 60% of call volume of the King County E-911 system.

When a vote of the Governing Board occurs, the members of the board voting in the minority may file a dissenting recommendation that shall also be forwarded with the action of the majority. The dissenting recommendation must be provided within 10 calendar days to be submitted with the action of the majority of the board.

The governing board should adopt rules to establish procedures for notice and timing of votes.

For purposes of calculating the 40% of board members present and voting the result shall be rounded up to the next whole number if there is a fractional outcome equal to .5 or greater and shall be rounded down if the fractional result is less than .5.

For purposes of calculating call volume percentages the King County E-911 Program Office shall annually on or before January 15th provide to the Governing Board updated total call volumes for each PSAP.

Decision Making and Dispute Resolution:

For all matters that are within the purview of the King County 911 Governing Board (Governing Board) the King County E-911 Program Office (Program Office) shall provide background, briefings, data, analysis, and financial review to the Governing Board to facilitate its review and recommendations to the Program Office. The Governing Board may also initiate proposals that are within their authority and the Program Office shall provide background, briefings, data, analysis, and financial review to facilitate review and recommendation by the Governing Board.

The Program Office and the Governing Board shall engage in a deliberative process with the objective of reaching a consensus decision of the Governing Board. Lacking consensus, and upon the request of a member with the appropriate second, the Governing Board may also vote and make a recommendation to the Program Office.

Concurrence:

If the Governing Board and Program Office concurs, the matter will be implemented, or if required, forwarded to the King County Executive (the Executive).

When an issue requires an action by the Executive, the recommendation of the Governing Board shall be provided to the Executive in a form as required by the Executive. When the action of the Executive is consistent with the recommendation of the Governing Board, the matter may be implemented or transmitted to the King County Council (the Council).

Executive Rejection or Modification of Recommendation:

If the Executive rejects or modifies the recommendation, the Governing Board shall be notified in writing with a description of the action and justification for the decision. The Governing Board may, within 30 calendar days, respond in writing to the Executive either concurring with the action or making an appeal for reconsideration which could include a request for a meeting with the Executive. The Executive then has 30 calendar days within which to respond to the Governing Board.

Program Office Rejection or Modification of Governing Board Action:

If the Program Office rejects or modifies a Governing Board recommendation, the Program Office must notify the Governing Board in writing within 10 calendar days with a description and justification for the Program Office action. The Governing Board shall have 10 calendar days to consider the Program Office decision before the Program Office takes any further action. Within that time the Governing Board may accept the Program Office position, engage in discussions with the Program Office seeking a mutually agreeable compromise, or appeal to the County Executive. Preparation of an appeal is the responsibility of the Governing Board.

On appeal, the Executive shall consider the recommendations of both the Governing Board and the Program Office. The Governing Board shall be notified of the Executive's decision in writing with a description of the action and justification for the decision. Upon receipt of that notification the Governing Board may, within 30 calendar days, respond in writing to the Executive either concurring with the action or to make an appeal for reconsideration which could include a request for a meeting with the Executive. In the case of an appeal for reconsideration, the Executive then has 30 calendar days within which to respond to the Governing Board.

Legislative Actions of the King County Council

In matters that require the approval of the Council the Program Office and the Executive shall follow all the same procedures as described before transmitting legislation to the Council. Upon Executive transmittal of legislation, the Governing Board may inform the Council of their support, opposition, or request for amendment through the public legislative process of the Council. The County Executive shall make all appropriate records of the Governing Board and the Program Office available to the Council and to the public to inform the Council process.

Roles and Responsibilities:

The Governing Board of the King County E-911 system shall inform and advise the King County E-911 Program Office, the King County Executive, and the King County Council on the regional King County E-911 system on subjects that affect the regional King County E-911 system and operations and finances of the PSAPs.

These would include, the proposed biennial budget, spending plans and schedules for operations and maintenance costs, , system and technology changes, platform and networking enhancement and modernization, strategic projects associated with NG-911 technologies and projects, discretionary Program Office or PSAP requests, implementation of the strategic plan, financial plan monitoring and modification, revenue distribution formula to PSAPs, and establishing and monitoring performance standards and measures.

The Governing Board may also refer to the Core Services, which have been defined as the first priority functions of the King County E911 Program Office. This list shall provide guidance to the governance body as it deliberates capital, operating, and funding priorities in the future.

Core Services:

Network, System, & Equipment

Call delivery from State 911 network to PSAPs; E911 phone maps; location data; GIS data; local network, security, and trunking.

Operations & Maintenance

Hardware for network, security, and telephony equipment; asset tracking; software licensing, updates, upgrades, fixes; vendor and PSAP coordination; transferring funds to PSAP for technical staff, PSAP operations, and equipment.

Project & Vendor Management

Project planning, budget and management; vendor delivery oversight and compliance.

System Access & Education

Social marketing strategies; education campaigns, events, training and materials; language interpretation services.

Regional Leadership

Local, state, and national associations and committees; legislative efforts; new technology and trends.

Administration & Finance

Program, vendor, and asset management; policies; staffing; data analysis; communications; budget; finance; strategic planning.

Governing Board Structure:

Each PSAP shall have one representative appointed to the Governing Board by the Director of the PSAP. The Director may appoint themselves. Length of term on the Governing Board shall be determined by the appointing authority. Designated alternates may participate in Governing Board discussions but may not vote or participate in consensus decisions in place of the appointed representative.

The Governing Board shall adopt by-laws to establish, officers, meeting schedules, committee structures, voting procedures, and other rules necessary to conduct the business of the board.

The King County E-911 Program Office will provide staff support for the Governing Board to hold and conduct their meetings.

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Appendix A

Technology & Operations Taskforce Draft Final Report

The Technology and Operations Taskforce was established to lead the strategic planning activities related to understanding and documenting local 9-1-1 needs within King County; developing an understanding of local, state and national trends and standards influencing 9-1-1 in the years ahead, including the continuing evolution of Next Generation 9-1-1 (NG911); and developing a framework to guide the future architectural configuration and operation of King County's 9-1-1 system into the future.

The Taskforce was Co-Chaired by Bill Kehoe (King County's CIO) and Chelo Picardal (City of Bellevue CTO), and included representatives from the various entities that composed the Planning Group within the overall Strategic Planning structure.

Technology and Operations Taskforce	
Taskforce Member	Representing
Bill Kehoe, Co-Chair	King County Executive
Chelo Picardal, Co-Chair	City of Bellevue
Jess Nelson	Large PSAPs
Micki Singer	Small PSAPs
Jessica Sullivan	King County Sheriff's Office
Tim Osgood	Fire Districts
Gregory Hough	City of Seattle Council
Krista Camenzind	King County Council
Russ St. Myers	City of Seattle PSAPs
Ron Tiedeman (formerly Dee Hathaway)	Sound Cities
Deb Flewelling	King County E-911 Program Office
Kellie Shapard	Hearing Impaired Community
Kenn Moisey	State of Washington E-911

Definitions

The Taskforce established several definitions for their work to provide some continuity in discussions within the Taskforce and with the overall Strategic Planning process.

Next Generation - (NG911):

For the purposes of this strategic plan, the working definition of NG911 is:

The transition of the 911 system from analog to digital communications technology, reflecting today's internet-based world.

This transition of analog to digital communications technology opens new capabilities beyond voice to deliver text, photo, video, and data from a caller to a 911 call center (PSAP) and potentially to a responder. Text and video communications – in particular – can impact accessibility to 911 for individuals with speech and hearing disabilities. NG911 also enhances PSAP operations with more accurate call location and routing, and enables connections between PSAPs that improve call transfers and interoperability for greater overall resiliency. NG911 is driven by national and statewide efforts, and each Regional E911 program can decide on which NG911 capabilities best align with its priorities, customer expectations, resources, and technology portfolio, as well as when and how those new capabilities should be phased in.

Emergency Services Internet-Protocol Network (ESInet; ESInet-II):

The statewide system for routing emergency calls. The State of Washington is in the process of deploying a new ESInet, often referred to as ESInet-II.

Feature:

A distinctive attribute or aspect of some technology. In this planning context, *features* are used within the PSAPs as part of answering and processing 911 calls.

Function:

The basic purpose of some element of the technology. In this planning context, *functions* are NG911 capabilities within the ESInet or the Regional E911 telephone system.

Interoperability:

The ability of computers, technology systems, or software to exchange and make use of information

NENA: National Emergency Number Association, a standards setting body for 911 related technology and operations.

Public Safety Answering Points (PSAPs):

Answering locations for 911 calls. In King County, the twelve PSAPs are governed and largely funded by the independent jurisdictions and agencies they serve.

Reliability: The quality of being trustworthy or of performing consistently well

Resilience: The ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Such disruptions might include deliberate attacks, accidents, or naturally occurring incidents.

Architectural Principles

The Taskforce first focused their attention on developing a set of Architectural Principles. Establishing these Principles early in the process provided the Taskforce with a common reference framework as further work was done to identify Strategic Objectives, Actions and Performance Metrics that could be used to guide King County's 9-1-1 environment into the future. The eight Architectural Principles are summarized below, and a complete overview of each principle is provided in Exhibit A.

1. **Public Safety** – Ensure that 911 services protect the public's safety above all else.
2. **Security** – All systems and solutions will need to meet at least the minimum levels of security defined.
3. **Fair and Equitable** – Provide fair and equitable access to 911 services so that communities across King County receive and perceive value.
4. **Cost Effectiveness** – Financial decisions are the most cost-effective solutions consistent with documented needs.
5. **Capacity** – The system is designed to meet peak demands without service interruption.
6. **Availability** – Solutions are available at all times without service interruption.
7. **Interoperability** – Software and hardware conform to defined standards of interoperability for data, applications and technology.
8. **Convergence** – Converge toward common solutions, approaches and standards.

Summary of Strategic Objectives, Actions and Metrics

With Architectural Principles in place, the Taskforce then established several working groups to develop deeper understandings on specific topic areas. These working groups conducted their own series of research and working meetings, and briefed the Taskforce on their findings and observations during bi-weekly Taskforce meetings. The five working groups are described below.

1. **Next Generation 911 (NG911) Readiness** – Preparing for the emerging capabilities of NG911 (e.g., text, photos, video, telematics, etc.) with a roadmap that adopts and adapts to technology changes, and balances operational needs with improved service and cost effectiveness.
2. **Integrated and Interoperable Systems** – Ensuring systems are integrated effectively to achieve reliable interoperability across organizations and functions in delivering seamless 911 services across the region.
3. **Security and Resiliency** – Protecting the 911 call flow, beginning at the State's ESInet, continuing through the various systems and transport mechanisms, and arriving at the PSAPs, while also ensuring the overall resiliency of the E911 systems and operations.

4. **Optimized Operations** – Providing reliable 911 services across King County that meet or exceed applicable standards by providing a combination of hardware and software systems, databases, networking and operational support that accurately locate and route calls to King County PSAPs delivered from the State ESInet.
5. **Accessible and Equitable Service** – Increasing equitable access to the 911 services for all communities and individuals served, with specific focus on lessening obstacles faced by groups with unique needs.

Each of these working groups concluded their work by identifying a set of Strategic Objectives, Actions and Metrics that were then reviewed and refined by the full Taskforce. The table below summarizes these Objectives, Actions and Metrics and the complete version of this table is included in Exhibit B.

Technology and Operations Strategic Objectives, Actions, & Performance Metrics

Categories	Objectives (what)	Actions (how)	Measures & Targets (how many)
NG911 Readiness	Objective #1: Adhere to Standards	NENA i3 Standards NENA Network & Interoperability Standards ESInet Standards	Ongoing monitoring of Standards and assessment of systems against those Standards
	Objective #2: NG911 Features	NG911 Features: – text-to-911 – enhanced text-to-911 – telematics – “over-the-top” apps Evolution of Standards Decision Criteria Implementation Timeline	Ongoing monitoring of Standards and assessment of systems against those Standards
	Objective #3: NG911 Functions	NG911 Functions: – ESInet-II Completion – geospatial routing – SIP call transport – end-to-end security – policy routing function – ADR functionality – location information – agency locator support Evolution of Standards Implementation Timeline	Ongoing monitoring of Standards and assessment of systems against those Standards

Categories	Objectives (what)	Actions (how)	Measures & Targets (how many)
	Objective #4: Evaluate and Adopt a System Architecture	Identify Options Review Options against Architectural Principles Review Options on Financial Criteria	Completed during this strategic planning process
Integrated and Interoperable Systems	Objective #1: Interoperability Features	Identify Options: – Carrier Diversity – High Availability – Survivability – Virtual PSAPs – Mobile PSAPs – Real-time Data Capture and Analysis Evolution of Standards Implementation Timeline	Ongoing monitoring of Standards and assessment of systems against those Standards
	Objective #2 Interoperability Functions	Identify Options: – Existing Structure – PSAP Needs – Bottlenecks – Potential Efficiencies – Routing Protocols – Data Protocols Evolution of Standards Implementation Timeline	Ongoing monitoring of Standards and assessment of systems against those Standards
Security and Resiliency	Objective #1: Security Standards	Staffing & Funding Certification Process Security Awareness Training	Annual staff security training: 75% in <u>2018</u> , 85% in <u>2019</u> , and 100% in <u>2020</u> +.
	Objective #2: Security Program	Security Policies Staffing & Funding	Governance structure in <u>1Q 2018</u> .
	Objective #3: Operations and Architecture	Implement IT Best Practices	Implement a process to measure key performance.
	Objective #4: Vendor Management	Vendor Management Best Practices Quarterly Reports	Include the standard language in all new vendor contracts and RFPs

Categories	Objectives (what)	Actions (how)	Measures & Targets (how many)
Optimized Operations	Objective #1: Standards and Policies	Demarcation Points Standards & Policies Governance	Routine review of E911 Program and PSAPs conformance
	Objective #2: Delivery Framework	KCIT Delivery Framework Project Management Standards	Creation and utilization of these delivery frameworks
	Objective #3 Operational Framework	KCIT Operational Framework Problem Management	Creation and utilization of these operational frameworks
	Objective #4 Business Continuity Management	KCIT Business Continuity Management KCIT Coordination	Creation and utilization of these BCM strategies
	Objective #5: Call Routing and Delivery	Routing Criteria Periodic Review	Creation and utilization of these call routing strategies.
Accessible and Equitable Service	Objective #1: Public Education and Outreach	Maintain and increase educational outreach Partner with community organizations Partner with organizations that that innovate with special needs communities Share community feedback with other agencies	Within the 1 st year of this Plan, create a periodic reporting mechanisms to demonstrate these activities are being accomplished.
	Objective #2 Reducing Barriers	Partner with PSAPs to continue to enhance training for call takers Support access to phone services for low-income people	Within the 1 st year of this Plan, develop mechanisms to routinely gather community feedback and identify training needs. Then, in the 2 nd year, develop a process with the PSAPs to deliver training as needed.

Categories	Objectives (what)	Actions (how)	Measures & Targets (how many)
	Objective #3: Modernizing Technology	Implement Text-to-911 and similar enhancements as they become available and stable Seek ongoing feedback about how E911 technologies are meeting community needs	Complete the implementation of Text-to-911 by Q1 2018. Within the 1 st year of this Plan, develop mechanisms to gather community feedback on the effectiveness of new solutions, and then expand this effort to include new and innovative technologies when appropriate.

Detailed Discussion of Objectives, Actions and Metrics

The following sections outline the current status, objectives, actions, and performance measurements and targets for these categories. Each section begins with an overview of the E911 system's current state and in-progress initiatives. This is followed by a list of objectives with actions and recommended performance metrics and targets if these can be determined at this time.

Next Generation 911 (NG911) Readiness

Preparing for the emerging capabilities of NG911 (e.g., text, photos, video, telematics, etc.) with a roadmap that adopts and adapts to technology changes, and balances operational needs with improved service and cost effectiveness.

Current State and In-Progress Initiatives

There are several in-progress initiatives, or aspects of the current environment, that serve as a baseline for this Strategic Category:

The State of Washington is in the process of deploying a new Emergency Services IP Network (ESInet), often referred to as ESInet-II. This network is being established in conformance with current National Emergency Number Association (NENA) i3 architectural standards and is planned to evolve with those standards as they undergo periodic upgrades and/or enhancements. When completed, will begin to offer the ability to implement a variety of NG911 Features and Functions to the PSAPs in Washington State if those PSAPs have implemented compatible systems and desire to utilize these Features or Functions.

The King County E911 Program Office (E911 Program Office) currently utilizes a decentralized system architecture, so transitioning the current architecture to an NG911 capable environment would require upgrades and/or enhancements at each of the PSAPs in the county. Currently all the PSAPs use a common vendor (West Safety Systems' VIPER 911 telephone systems). The larger PSAPs

in King County have recently undergone a refresh cycle for this equipment, and this work is now being planned for the smaller PSAPs. Further evaluation of these systems will be needed as the State's ESInet-II is deployed to determine if further enhancements would be needed to meet desired Feature, Function and Security requirements.

The E911 Program Office is engaged in an interim deployment of Text-to-911 technology that should be able to provide this capability to the PSAPs until the full deployment and functionality of ESInet-II is in place.

NG 911 Readiness Objective #1 – Adhere to Standards

The E911 Program Office will only pursue technology investments that are consistent with the NENA i3 framework and compatible with the ESInet-II being deployed by the State of Washington.

(Goal: Meet or Exceed Industry Standards.)

The following **Actions** will be taken:

- A. **NENA i3 Standards** – Monitor the NENA i3 standards process (current version NENA-STA-010.2-2016) to guide decisions on technologies and service providers. NENA i3 is the industry standard defining NG911 capabilities.
- B. **NENA Network & Interoperability Standards** – Monitor NENA Network & Interoperability Standards (03-004; 03-503; 03-506) to achieve compliance and guide future architectural decisions.
- C. **ESInet Standards** – Monitor Washington ESInet standards and guidelines, such as E-911 and NG911 Systems and Network Infrastructure and Security Standards for Washington State Public Safety Answering Points, to guide integration efforts and future decisions

Measurements & Targets: This Objective will require ongoing monitoring of relevant Standards and continuous evaluation of current system characteristics and planned changes to maintain adherence to these Standards.

NG911 Readiness Objective #2 – NG911 Features

The E911 Program Office will partner with the future governing entity to consider and adopt appropriate NG911 features as they become available and as they are needed within the PSAP community. In this context, these features are NG911 capabilities that the PSAPs would use in handling 911 interactions with the calling public.

(Goals: Meet or Exceed Industry Standards; Equity.)

The following **Actions** will be taken:

- A. **NG911 Features** – Pursue NG911 Features that have the greatest customer and operational benefit, including text-to-911; evolved text-to-911; telematics; and “over-the-top” applications.

Text-to-911. The ability for the public to interact with 911 via text messaging is already a King County priority, and an “interim” strategy to accomplish this is coming.¹

¹ The foundations for this strategy can be found in NENA's Interim SMS Text-to-9-1-1 Information and Planning Guide at: http://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Docs/SMS_Text_Info_and_Planning.pdf.

The “interim” strategy is based on using the wireless carrier’s short message service (SMS) text messaging services. No photos or additional material can be attached to these messages. Messages are sent through a carrier-selected Text Control Center (TCC) and then delivered to existing PSAPs either through a virtual private network (VPN) connection to their 911 telephone system equipment, typically referred to as the customer premise equipment (CPE) or through an internet connection to a stand-alone PC-based web browser application.

The State ESInet will be configured to become the pathway between the TCCs and the PSAPs, so once this network is fully deployed and operational at all PSAPs, it would become the replacement for the VPN or browser solutions as long as the PSAP’s CPE is capable of handling text messages in the NENA i3 prescribed manner.

Therefore, from a strategic planning perspective for the King County setting, the Strategies to deal with SMS text-to-911 capability would include:

- Complete the current project to implement the “interim” strategy within the current system architecture of 12 stand-alone PSAPs, with the goal being to migrate the message transport services to the ESInet-II once it is fully operational. During this process include outreach with the deaf community and other special needs communities so they are aware of the solutions being implemented and have an opportunity to provide input on their use and effectiveness.
 - This stage of texting evolution will likely be completed in early 2018.
- Perform necessary upgrades or replacements of the 911 telephone systems at each PSAP to prepare them for handling SMS text-to-911 from the ESInet-II connection.
 - This effort may take some period of time given the current number of individual PSAP CPE systems. It may also be impacted if a decision were made to evolve the King County system architecture towards one or more shared systems. Therefore, the potential timeline for this evolution may extend to 2020 or beyond.
- Migrate SMS-based text-to-911 to the ESInet-II transport, making this a true “NENA i3” end-to-end solution.
 - This effort may take place on a PSAP-by-PSAP basis if the current system architecture is continued, and therefore take place concurrently as the CPE is readied. It may also be deferred until all current systems, or a new shared-system architecture is fully readied. Therefore, it is likely this final transition step may not be completed until 2020 or beyond.

Evolved Text-to-911. There are two evolutionary steps coming in the ability to interact with 911 via text messaging; utilization of Multimedia Messaging Emergency Services (MMES), and utilization of Real Time Text (RTT). These technologies will allow a number of enhanced text-to-911 functions such as the embedding of photos, video or other content along with the text message flows. RTT is perceived as advantageous over SMS-based texting since it allows sender and receiver to see the text of messages appearing as the message is composed. This allows them to gain information in close to real time rather than waiting for the message to be fully composed and sent, thus improving the quality of the bi-directional exchange.

The timelines for these technologies is unclear. The Federal Communications Commission (FCC) recently released a Report & Order (FCC 16-169 Transition from TTY to Real-Time Text

Technology 12/16/2016) which establishes a pathway for wireless carriers to opt to implement RTT technology as a replacement for their current obligation to provide TTY functionality servicing the deaf community over their networks. The major carriers are supportive of the R&O, and the ultimate migration to this technology may take place within the next 2 years.

Therefore, from a strategic planning perspective for the King County setting, the potential Strategies to deal with text-to-911 evolutions might include:

- Monitor and engage in the standards development processes related to the use of MMES and RTT in the 911 domain.
- Monitor the pace at which the carrier and CPE vendor communities begin to embrace these standards
- Work with the PSAPs to develop countywide policies on if, when and how enhanced text messaging will be handled at the PSAPs. This will include establishing decisions about what will and won't be done, how the decided course of action will be funded, and how to coordinate these actions across all PSAPs.
- Engage with the deaf community and other special needs communities to include their perspectives in the development and deployment of enhanced texting capabilities.
- Engage with the State in any ESInet transition planning in preparation for their ability to handle MMES and RTT traffic, including adjustments to ESInet bandwidth to PSAPs that will be handling these enhanced messages. (preliminary timeframe for this is still under development with the State's ESInet vendor)
- Work with the CPE vendor(s) supporting King County PSAPs to make sure they are prepared for these enhanced features at the PSAPs that will be handling these enhanced messages.

The potential timelines for an evolution to enhanced texting capabilities is unknown at this point in time. Once the standards are in place, it will take a period of several years for the carrier and CPE community to fully embrace and implement these standards. Further time would then be needed to roll out the operational policies and procedures on how these enhanced features would be implemented and managed.

For purposes of the King County strategic planning effort, the following evolutionary steps are envisioned:

- The most likely first enhancement would be the ability for photos to be attached to text interactions with 911. The earliest this is envisioned in the King County setting would be after the full migration to ESInet transport and capable CPE, so somewhere beyond 2020.
- This would be followed by expanding this capability to include attaching video clips to text interactions with 911. Conceptually this could materialize as an operational feature in the 2020 to 2021 timeframe.
- The final step would be fully interactive text and enhanced media interactions, where photos and video could be simultaneously transmitted along with text. Conceptually this could materialize as an operational feature in the King County system in the 2021 to 2022 timeframe.

Telematics Services Interfaces. Within the automotive industry, there is a broad array of automatic crash notification and data available that is currently transmitted to private call centers, such as OnStar. Some in the 911 and emergency services field believe this data would be useful to either 911 centers or to responding agencies if it could be transmitted to them before arrival at the scene. The ESI-net provides the most-likely pathway to effective route and transmit this data between these private call centers and the PSAPs. Further, conveyance of this data to field responders could then be ‘passed through’ the PSAP via either their existing wireless broadband services, or eventually through the FirstNet public safety broadband network.

There is considerable debate in the PSAP community, nationally and locally, on whether the PSAPs should even be involved in receiving and/or doing anything with this data. Some have suggested that the ESI-nets and PSAPs may be used purely as data-pathways for moving this data from the private call centers and responding units. There are also some in the responder community that question the need for this data in the field, particularly in situations where response times are relatively short.

Therefore, from a strategic planning perspective for the King County setting, potential Strategies to deal with telematics services might include:

- Monitor and engage in the standards development processes related to the flow of telematics data to PSAPs and response agencies.
- Work with the PSAPs and response agencies to develop countywide policies on if, when and how telematics data will be utilized in the King County setting.
- Engage with the State in any ESI-net transition planning in preparation for their ability to handle telematics traffic, including adjustments to ESI-net bandwidth to PSAPs that will be handling these enhanced messages. This would include establishing the technology and security policies involving any interfaces to wireless broadband services linking response agencies.
- Work with the CPE vendor(s) supporting King County PSAPs to make sure they are prepared for these enhanced features at the PSAPs if it is decided to utilize these services.
- Work with response agencies to establish the technology and procedural policies to deal with the ESI-net-to-that will be handling these services.

From an overall timeline perspective, work on enabling the transport of telematics data to 911 and first responders is likely to take place in parallel with work on things like text, photos and video. Therefore, the potential timeline for telematics capabilities could mirror these other efforts and perhaps come faster than these efforts. Therefore, for purposes of the King County strategic planning effort, they are being estimated in the 2020 to 2022 timeframe.

Over the Top (OTT) Applications. The wireless device application domain is already populated by a number of “instant messaging” applications to enable communications between users on either wireless devices or traditional PCs. There are also emerging “apps” that attempt to ‘enhance’ the ability to call or interact with 911 by providing a variety of targeted public safety related features such as linking to enhanced data about the caller, providing enhanced information about the caller’s location, etc. These apps run on their own back-end services and ride “over the top” of the carriers’ wireless networks, and therefore outside of the carrier’s

ability to route the traffic to 911 through mechanisms established for text-to-911. While the community pressure to consider implementing these apps may be several years away, it may be that within the 10-year strategic planning horizon the King County plan will need to consider these.

Therefore, from a strategic planning perspective for the King County setting potential Strategies to deal with OTT applications might include:

- Monitor and engage in the standards development processes related to the emergency of these apps and their ability to interact with 911.
- Work with the PSAPs to develop countywide policies on if, when and how these applications will be supported in the King County setting.
- Engage with the State and other Counties to establish policies on if, when and how these applications will be supported statewide.

Given the potential complexity for establishing standards and technologies to allow multiple OTT applications to interact with 911 in a cohesive manner, and the potentially intense policy debate on whether to even allow this capability, it seems likely that this evolution will not take place for several years. For purposes of the King County strategic planning effort, they are being estimated in the 2023 and beyond timeframe.

- B. **Evolution of Standards** – Monitor the evolution of standards development, and their adoption and implementation within the State ESInet-II, to evaluate the maturity, viability and supportability of new features and their applicability to King County's needs.
- C. **Decision Criteria** – Develop decision criteria to weigh the benefits of new features with their operational and fiscal impacts, and to determine the phasing of deployment.
- D. **Implementation Timeline** – Establish a roadmap and timeline for the implementation of features across the region-wide 911 system in collaboration with the PSAPs and as part of the overall 911 governance model established within this strategic planning process.

Measurements & Targets: This Objective will require ongoing monitoring of relevant Standards and continuous evaluation of current system characteristics and planned changes to maintain adherence to these Standards.

NG911 Readiness Objective #3 – NG911 Functions

The E911 Program Office, in partnership with the PSAPs, will identify a group of NG911 functions, most of which are characteristics of how the ESInet-II will function, that will improve call delivery and capabilities.

(Goals: Meet or Exceed Industry Standards; Equity; Seamless System-wide Technology.)

The following **Actions** will be taken:

- A. **NG911 Functions** – Deploy NG911 functions with the greatest customer and operational benefit. These include ESInet-II; geospatial routing; session initiated protocol (SIP) call transport; call security; routing policies; additional data repository (ADP) functionality; location information; and agency locator support.

Complete Transition of all PSAPs to ESInet-II – Once the new ESInet is fully deployed, tested, and operational, each of the individual PSAPs will need to go through a process of migrating to

the new ESInet. This process will include testing and cutover planning with each individual PSAP, and is expected to be completed by early 2019.

Complete Transition of all Carriers to ESInet-II Connectivity – Once all the PSAPs are fully transitioned to the new ESInet, testing and migration work will continue with the carriers. This will likely not result in many (if any) noticeable impacts at the PSAPs themselves, but will involve extensive testing and coordination with the carriers.

Evolution of Call Routing to Geospatial Routing – The identified end-state for the NENA i3 architecture is for all call routing to be based on the geo-coordinate of each individual call to 911. This requires that mechanisms be in place for the geo-coordinate of each call to be identified **and** an ability to then route the call based on that geo-coordinate. This will require the wireline and VoIP carrier community to move away from the use of the Master Street Address Guide (MSAG) for table-based routing lookups to establishing identified geo-coordinates for each subscriber line termination. It will also require that the ESInet's geographic information system (GIS) data be highly accurate and up-to-date so that appropriate routing can be accomplished.

Until all the statewide GIS data is fully ready for transition to geospatial routing (which may not occur until the end of 2019, the new ESInet will establish and support an Automatic Location Information (ALI) database to support call routing. From a King County strategic planning perspective, this will mean that close coordination between King County and the State will continue to evolve so that the ESInet's GIS data sets have the levels of completeness and accuracy to allow the migration to geospatial routing.

Full conversion to NENA i3 SIP Call Transport – The identified end-state for the NENA i3 architecture is for all traffic entering, transiting and exiting the network to conform to Session Initiated Protocol (SIP) standards established in the NENA i3 model. To achieve this, carriers and PSAPs will need to undergo equipment and protocol transitions to achieve the desired end-state. Within the King County PSAPs, the CPE in use does not currently support the NENA i3 SIP interface, so ESInet-II traffic will be converted to legacy Centralized Automatic Message Accounting (CAMA) trunks for interface to the existing CPE. To complete the transition to full NENA i3 SIP call transport end-to-end, the 911 telephone systems at King County's PSAPs will need to be either upgraded or replaced with NENA i3 compliant systems. This could be accomplished through either of the system architectures discussed later in this report.

Fully developed and deployed security through the full ESInet and CPE/Workstation pathway – Since the NENA i3 architecture is founded on IP networking, routing and security principles, a robust network security model will need to be implemented from the point of ingress into the network from the carriers all the way through to the point of egress to the Call Receiving Workstation. This will require security systems, policies, personnel and processes at the State, County and PSAP levels. From a King County strategic planning perspective, this will be an ongoing process throughout the 10-year planning period.

Implementation of the Policy Routing Function – The NENA i3 architecture will allow IP Routing rules to be established that can provide increased flexibility on how calls get routed to alternate PSAPs if capacity or connectivity isn't available and the Primary PSAP initially targeted for the call. This can allow interagency agreements to be established between PSAPs that would allow them to provide backup or surge capacity for each other and to have these call routing plans already pre-established in the Policies applied in the call routing function. From the perspective

of the ESInet-II itself, this functionality should be available in early 2019. The actual implementation of Policy Routing will depend on each County 911 Program working with their PSAPs (and/or neighboring PSAPs) to establish agreements for any desired routing policies. It is anticipated this work would take place in the 2019 timeframe.

Implementation of Additional Data Repository (ADR) functionality – This database will allow additional information about the caller (such as pre-existing medical information, specific location or routing information, etc.) to be stored within the ESInet so that it can be retrieved by any PSAP receiving a 911 call from that caller. This Repository will also be used for the “LocationbyReference” information needed for delivering pseudo-location information for wireless calls that can then be queried for the actual geo-coordinate information for the caller for mapping display. This functionality may be in place within ESInet-II by 2020, but County 911 Programs and PSAPs may not begin utilizing it for specific caller information until they have put in place policies and practices for what information will be stored and how it will be maintained. They will also need to have their CPE fully compliant with the NENA i3 standards to access this functionality. For King County, this could conceivably take place in the 2020-21 timeframe as NENA i3 compliant systems are deployed across the King County PSAPs.

Implementation of Location information with Calls – Within the NENA i3 architecture, 911 calls from wireline and static VoIP devices will query the Location Information Server (LIS) to determine the location of the caller and pass this “LocationbyValue” information to the PSAP along with the SIP call traffic. This replaces the current Automatic Location Information (ALI) database lookup that the PSAP CPE currently performs in the existing system architecture. For wireless and dynamic VoIP calls, the “LocationbyReference” process will be used to store the actual geo-coordinate location of the calling device (likely in the ADR described above) so it can be queried and utilized by the PSAP CPE once the call arrives. This capability won’t be fully available until all carriers complete their transition to full NENA i3 SIP call delivery, which cannot be accurately predicted at this time.

Agency Locator Support – The NENA i3 architecture identifies a large number of data elements that are logged as a part of the call flow, and the logging service can reside within the ESInet itself or at the PSAP. Each logged element creates an “Agency Locator Record” that includes a Universal Resource Identifier (URI) address to the logging service where the element is stored so that this logged data can be queried by the PSAPs if needed. As with other core ESInet-II functions, this capability will be in place at the completion of the ESInet-II deployment in early 2019. The degree to which the logged data will be utilized by the PSAPs will depend on when they complete their full migration to NENA i3 compatible interfacing to the ESInet, so for King County this would be concurrent with the 2019-20 deployment timeframe.

- B. **Evolution of Standards** – Monitor the evolution of standards development, and their adoption and implementation within the State ESInet-II, to evaluate the maturity, viability and supportability of new functions and their applicability to King County’s needs.
- C. **Implementation Timeline** – Establish a roadmap and timeline for the implementation of functions across the region-wide 911 system in collaboration with the PSAPs and as part of the overall 911 governance model established within this strategic planning process.

Measurements & Targets: This Objective will require ongoing monitoring of relevant Standards and continuous evaluation of current system characteristics and planned changes to maintain adherence to these Standards.

NG911 Readiness Objective #4 – Evaluate and Adopt a System Architecture

The E911 Program Office, working with regional partners and the governance process established from this strategic planning process, will identify an overall system architecture for NG911 capable telephone systems and networking to allow PSAPs to effectively access and utilize the selected NG911 Features and Functions.

(Goals: Meet or Exceed Industry Standards; Seamless System-wide Technology; Secure, Resilient and Survivable.)

The following **Actions** will be followed:

- A. **Identify Options** – Identify system architecture alternatives that have proven successful in other comparable jurisdictions, adhere to the NENA i3 standards, and are judged to be applicable to King County's needs.
- B. **Review Options against Principles** – Review these options against the Architecture Principles, and identify and compare their individual advantages and disadvantages, so that the strategic planning process can select a system architecture for implementation moving forward.
- C. **Review Options on Financial Criteria** – Coordinate with Finance Taskforce to assess financial/resource impacts of each architectural option.

Measurements & Targets: This strategic planning report from the Technology and Operations Taskforce identifies two system architecture alternatives that meet the established Architectural Principles and Strategic Objectives. Each alternative has a variety of advantages and disadvantages that will need to be evaluated when considering which architecture to implement into the future. The potential milestones for this implementation process is described at the end of the System Architecture Alternatives section of this report.

Integrated and Interoperable Systems

Ensuring systems are integrated effectively to achieve reliable interoperability across organizations and functions in delivering seamless 911 services region-wide.

Current State and In-Progress Initiatives

There are several in-progress initiatives, or aspects of the current environment, that serve as a baseline for this category:

- The State of Washington's deployment of ESInet-II.
- The capabilities of the current or soon-to-be refreshed PSAP equipment relative to the features and functions becoming available across the ESInet-II.
- Existing operational strategies utilized by the PSAPs with overlapping responsibilities between law enforcement dispatching and Fire/EMS dispatching.
- Existing backup and or interoperability relationships and technology capabilities that may already be established between the PSAPs.

Integrated and Interoperable Objective #1 – Interoperability Features

The E911 Program Office in partnership with PSAPs will identify a group of interoperability features for consideration and adoption during the 10-year Strategic Plan timeframe. These

features may include characteristics such as survivability, geographic and carrier diversity, high availability, and resiliency.

(Goals: Meet or Exceed Industry Standards, Seamless System-wide Technology; Secure, Resilient and Survivable.)

The following **Actions** will be taken:

- A. **Identify Options** – Work with internal and external industry experts to identify and understand:
 - **Carrier Diversity** – Current carrier capabilities and potential for carrier diversity, regardless of the overall architecture selected for King County.
 - **High Availability** – Identifying effective practices to achieve a highly available, resilient and diverse system across all the PSAPs in King County.
 - **Survivability** – Working within existing or future Memorandums of Agreement (MOAs) with other agencies, potentially outside of the region, for developing a continuity of operations plan bolstering survivability from ESInet-II.
 - **Virtual PSAPs** – Exploration of Virtual PSAP capabilities to allow platform-based architectures to be expanded to create PSAP capabilities at locations other than established PSAPs.
 - **Mobile PSAPs** – Exploration of Mobile PSAP capabilities to allow temporary or tactical PSAPs to be established to support unique circumstances
 - **Real-time Data Capture** – Real-time monitoring and baseline data capture (for example to adapt to surges in call volumes)
- B. **Evolution of Standards** – Monitor the evolution of standards development, and their adoption and implementation within the State ESInet-II, to evaluate the maturity, viability and supportability of new features and their applicability to King County's needs.
- C. **Implementation Timeline** – Establish a roadmap and timeline for the implementation of functions across the region-wide 911 system in collaboration with the PSAPs and as part of the overall 911 governance model established within this strategic planning process.

Measurements & Targets: This Objective will require ongoing monitoring of relevant Standards, industry practices and local needs so that local systems can be adapted over time to best meet those needs.

Integrated and Interoperable Objective #2 – Interoperability Functions

The E911 Program Office working in partnership with PSAPs will identify interoperability Functions (mostly characteristics of how the ESInet-II will function) that will improve call delivery and capabilities at the PSAPs.

(Goals: Meet or Exceed Industry Standards; Seamless System-wide Technology; Secure, Resilient and Survivable.)

The following **Actions** will be taken:

- A. Work with internal and external industry experts to identify and understand:

- **Existing Structure** – How PSAPs are currently interconnected (both from a 911 context and across other systems/networks) and highlight processes that work well and need to be sustained or processes that are candidates for improvement.
 - **PSAP Needs** – Needs of each PSAP for interoperability to their respective backup PSAP.
 - **Bottlenecks** – Network bottlenecks, busy signal data, and current roll-over capabilities.
 - **Potential Efficiencies** – Potential for Class of Service or other trunking efficiencies.
 - **Routing Protocols** – Evolving routing protocols within the ESInet.
 - **Data Protocols** – Explore further use of interoperable data protocols (EIDD, XML, etc.) between PSAP systems.
- B. **Evolution of Standards** – Monitor the evolution of standards development, and their adoption and implementation within the State ESInet-II, to evaluate the maturity, viability and supportability of new functions and their applicability to King County's needs.
- D. **Implementation Timeline** – Establish a roadmap and timeline for the implementation of functions across the region-wide 911 system in collaboration with the PSAPs and as part of the overall 911 governance model established within this strategic planning process.

Measurements & Targets: This Objective will require ongoing monitoring of relevant Standards, industry practices and local needs so that local systems can be adapted over time to best meet those needs.

Security and Resiliency

Protecting the 911 call flow, beginning at the State's ESInet, continuing through the various systems and transport mechanisms, and arriving at the PSAPs, while also ensuring the overall resiliency of the E911 systems and operations.

Current State and In-Progress Initiatives

There are several in-progress initiatives, or aspects of the current environment, that serve as a baseline for this Strategic Category:

- Currently, the E911 Program does not have a visible way to track security vulnerabilities, which puts the system at risk. A Security Risk Assessment process is underway during 2017.
- Expectations and awareness regarding the security policies and procedures that should be adhered to are not standardized within the E911 Program Office. This includes the lack of a formalized security awareness and training program and sporadic application of system and network patches and security releases.
- Vendors are not held accountable to regular security audits and contract language needs to be standardized and improved to increase vendor accountability for implementing and adhering to industry, State and E911 Program Office security standards.
- Routine upgrades, patches and version upgrades are currently underway on various networking components, in addition to the previously mentioned VIPER telephone systems refreshes.

Security and Resiliency Objective #1 – Security Standards

The E911 Program Office will identify, understand and apply security standards and practices, including King County Security and Privacy policies, that align across the 911 industry, the ESInet-II, and the requirements of King County and the PSAPs. This strategy maps to the Planning Goals of Meeting or Exceeding Industry Standards and achieving a Secure, Resilient and Survivable 911 environment.

The following **Actions** will be taken:

- A. **Staffing & Funding** – Ensure appropriate level of staffing and funding is in place to continually meet the security objectives of the E911 standards requirements.
- B. **Certification Process** – Establish mechanisms so that personnel working with security issues for the regional E911 phone system can complete an industry approved security certification process. Identify the approved security certificate program by 1Q 2018 and have 25 individuals take the training and earn the certificate in 2018. The training will be available in subsequent years for new hires and those who are yet to take the training, as well as personnel that want to refresh or renew their certificates.
- C. **Security Awareness Training** – Establish an annual security awareness training for appropriate E911 Program Office staff.

Measurements & Targets: All E911 Program and PSAP staff will be required to take security awareness training on a yearly basis to stay current on the security policies and standards that apply to their job functions. The target will be 75% of staff trained in 2018, 85% of staff trained in 2019, and 100% of staff trained in 2020 and beyond.

Security and Resiliency Objective #2 – Security Program

The E911 Program Office will develop an E911 security program that is aligned and integrated with the King County Information Assurance / IT Security Program to ensure that security policies, awareness and practices are understood and integrated into components of the E911 program. This will also ensure data and security roles and responsibilities as described by the NENA security standards are assigned and understood.

(Goals: Meet or Exceed Industry Standards; Secure, Resilient and Survivable.)

The following **Actions** will be taken:

- A. **Security Policies** – Establish E911 security policies and practices with PSAPs that clearly articulate expectations and roles and responsibilities between the E911 Program Office and PSAPs and King County Information Assurance policies, in adherence to KC IT Security Program, established IT security best practices and 911 security standards.
- B. **Staffing & Funding** – Ensure appropriate level of staffing and funding is in place to continually meet the security objectives of the E911 standards requirements.

Measurements & Targets: A security governance structure has been developed and documented. The E911 Program Office and PSAP staff are engaged in the governance structure and in meetings. The target will be to develop the governance structure in 1Q 2018 so that it can be informed by the current E911 Strategic Planning Group and the Governance Taskforce.

Security and Resiliency Objective #3 – Operations and Architecture

Continue to enhance system resiliency. Focus on reliability (ability to handle expected load); redundancy (eliminate single points of failure), and diversity (minimize overreliance on single providers, vendors, or equipment). The system architecture should also optimize the availability of PSAPs to serve as backup(s) to other PSAPs.

(Goals: Meet or Exceed Industry Standards; Secure, Resilient and Survivable; No Request Lost.)

The following **Action** will be taken:

- A. **Implement IT Best Practices** – Implement IT operational best practices to mitigate security risks including the disciplines of asset management, change management, problem diagnostics and management, incident management, patch management / software and hardware upgrades, and lifecycle management

Measurements & Targets: Implement a process at the E911 Program Office to measure and report key performance: availability, blocked calls (not able to be delivered to the PSAP), calls in the queue (ESInet-II), dropped calls, unanswered calls, calls answered, calls dispatched, type of call (landline, cell, VoIP, text). These processes can commence immediately and will be continuously evolving over time.

Security and Resiliency Objective #4 – Vendor Management

Standardize the vendor selection and on-going monitoring processes by developing standard business and technical specifications, service level agreement (SLA) requirements that can easily be measured, and accountability language with appropriate penalties for non-compliance. Require the E911 Program Office to conduct and require security or technical audits on a regular basis as required by NENA and State standards.

(Goals: Meet or Exceed Industry Standards; Secure, Resilient and Survivable; No Request Lost.)

The following **Actions** will be taken:

- A. **Vendor Management Best Practices** – Ensure vendor management best practices are followed to minimize risks of failure from mission critical vendors and service providers.
- B. **Quarterly Reports** – Require quarterly reports from E911 Program Office vendors on performance against the contract SLAs and analyze vendor performance over time to spot emerging adverse trends.

Measurements & Targets: Standard security requirements and language are developed in coordination with KCIT Information Assurance and contracts staff, PSAP staff, and E911 Program Office staff. The target is to include the standard language in new vendor contracts and RFPs developed by the E911 Program Office and/or developed in partnership with PSAPs. These processes can commence immediately as any new procurement or project initiative is launched.

Optimized Operations

Providing reliable 911 services across King County that meet or exceed applicable standards by providing a combination of hardware and software systems, databases, networking and

operational support that accurately locate and route calls to King County PSAPs delivered from the State ESInet-II.

Current State and In-Progress Initiatives

There are several in-progress initiatives, or aspects of the current environment, that serve as a baseline for this Strategic Category:

- The current decentralized system architecture of VIPER telephone systems in each of the PSAPs is undergoing a refreshment process, with the larger PSAPs recently completed and the smaller PSAPs still to be completed.
- Additional projects are underway to enhance current networking to each of the PSAPs for non-911 data connectivity needs (such as retrieving operational statistics from the VIPER systems).
- Ongoing coordination with the State is underway to plan and execute the migration of the PSAPs to ESInet-II once its deployment and testing are complete and other PSAPs around the State with similar VIPER telephone system equipment have undergone successful migrations.
- An interim solution is being implemented to provide Text-to-911 capabilities until full NG911 Features and Functions are enabled through ESInet-II.
- The E911 Program Office is currently undergoing an organizational transition from the Office of Emergency Management to King County Information Technology (KCIT).

Optimized Operations Objective #1 – Standards and Policies

Define and develop standards and policies that clearly define the roles and responsibilities of the E911 Program Office and the PSAPs for the current decentralized system architecture, and adapt these standards and policies as needed if the system architecture undergoes any changes.

(Goals: Meet or Exceed Industry Standards; Secure, Resilient and Survivable; Seamless System-wide Technology.)

The following **Actions** will be taken:

- Demarcation Points** – Define the appropriate demarcations between the E911 Program Office and the PSAPs, and between the E911 Program Office and the State 911 Program, for each individual technology system or operational responsibility so that clear responsibility and accountability paths are established.
- Standards & Policies** – Develop standards and policies that are consistent with over-arching NENA i3 and related standards and tailored to the unique needs of King County and the PSAPs.
- Governance** – Formulate, review and adopt standards and policies through a governance process that result in cost efficiencies or affirm the core mission and goals of the E911 Program.

Measurements & Targets: Achievement of these Strategies will be measured by the successful creation of these standards and policies, and the routine review of E911 Program Office and PSAPs conformance to them. This process has already begun during the strategic planning process and will be an ongoing activity going forward.

Optimized Operations Objective #2 – Delivery Framework

Establish a delivery framework that imposes appropriate governance and controls on both project and change management workloads.

(Goals: Meet or Exceed Industry Standards; Secure, Resilient and Survivable; Seamless System-wide Technology.)

The following **Actions** will be taken:

- A. **KCIT Delivery Framework** – Adapt current KCIT delivery framework strategies to the responsibilities of the E911 Program Office.
- B. **Project Management Standards** – Implement industry standard program and project management techniques, such as those defined by the Project Management Institute (PMI) for their Project Management Professional (PMP) certification or from the Praxis Framework established by the Association for Project Management.

Measurements & Targets: Achievement of these Strategies will be measured by adoption these delivery frameworks, which has already begun during this strategic planning process.

Optimized Operations Objective #3 – Operational Framework

Establish an operational framework based on the Operational IT Infrastructure Library (ITIL) model that clearly defines and governs operational, maintenance, and forward-looking workloads.

(Goals: Meet or Exceed Industry Standards; Secure, Resilient and Survivable; Seamless System-wide Technology.)

The following **Actions** will be taken:

- A. **KCIT Operational Framework** – Adapt current KCIT operational framework strategies to the responsibilities of the E911 Program Office.
- B. **Problem Management** – Implement change control, major incident processes, and problem management disciplines consistent with existing KCIT practice and adapted to E911 Program Office responsibilities.

Measurements & Targets: Achievement of these Strategies will be measured by adoption and use of these frameworks. This work will commence with the formal transition of the E911 Program Office into the KCIT organizational processes and will be a continuous process going forward.

Optimized Operations Objective #4 – Business Continuity Management

Establish a Business Continuity Management (BCM) strategy that delineates between E911 Program Office BCM responsibilities and PSAP BCM responsibilities, and establishes both technical and non-technical response solutions. This strategy maps to the Planning Goals of Meeting or Exceeding Industry Standards and achieving a Secure, Resilient and Survivable 911 environment.

The following **Actions** will be taken:

- A. **KCIT Business Continuity Management** – Adapt current KCIT BCM methodologies to the E911 Program Office.

- B. **KCIT Coordination** – Coordinate overall BCM planning within the context of the Actions already identified related to NG911 Readiness, establishing Integrated and Interoperable systems, and any architectural changes to the overall NG911 environment in King County.

Measurements & Targets: Achievement of these Strategies will be measured by the adoption and use of BCM strategies. This work will commence with the formal transition of the E911 Program Office into the KCIT organizational processes and will be a continuous process going forward.

Optimized Operations Objective #5 – Call Routing and Delivery

Establish a process for determining the appropriate routing of calls to PSAPs that takes into consideration the capacities and capabilities of the PSAPs receiving those calls.

(Goals: Prompt Response; No Request Lost; Seamless System-wide Technology.)

The following **Actions** will be taken:

- A. **Routing Criteria** – Establish mutually agreeable criteria with the PSAPs for determining how routing decisions are made, particularly for the ever-changing world of cell site additions or coverage changes by multiple wireless carriers.
- B. **Periodic Review** – Periodically review and adjust the routing criteria to make sure they remain consistent with PSAP operational needs, capacities and capabilities.

Measurements & Targets: Achievement of these Strategies will be measured by the successful creation and utilization of these call routing strategies. While this objective is already a topic of continuing discussion and work within King County, the establishment of new Policy Routing Functions within ESInet-II will initiate a concentrated process of reviewing these criteria as ESInet-II deployment moves forward.

Accessible and Equitable Service

Increasing equitable access to the 911 services for all communities and individuals served, with specific focus on lessening obstacles faced by groups with unique needs. Please refer to Appendix B, the Full Report from the Accessible and Equitable Service working group established as part of the Technology and Operations Taskforce.

Current State and In-Progress Initiatives

There are several in-progress initiatives, or aspects of the current environment, that serve as a baseline for this Strategic Category:

- The E911 Program Office conducts ongoing public education and outreach related to the proper use of 911. This includes topics such as educating youth, an accidental call campaign, and multicultural campaign.
- The Program Office also develops and distributes a variety of 911 educational material that is used by local public safety agencies in their public education and outreach programs. The Program Office also partners with local public safety agencies in public outreach events.
- The Program Office currently has master contracts in place with three separate language interpretation services. These services are used by the PSAPs to handle 911 calls from non-

English speaking callers. Currently each year approximately 10,000 911 calls in King County require the use of language translation, with over 50 languages being utilized.

- The Program Office provides TTY equipment to the PSAPs for communicating with deaf callers, but many in the deaf community prefer to access 911 by using video relay services of their own selection that they use to place calls to 911.
- King County does not currently have text-to-911 capability in place, and the E911 Program Office is currently engaged in a project to deploy this capability at each of the PSAPs in King County.

Accessible and Equitable Service Objective #1 – Public Education and Outreach

The E911 Program will improve public understanding of the purpose of 911 and how it works. *(Goals: Prompt Response; No Requests Lost; Equity.)*

The following **Actions** will be taken:

- Maintain and Increase Educational Outreach** – The King County E911 Program Office will sustain its public education and outreach efforts, in close coordination with the PSAPs and other public safety organizations such as King County Emergency Medical Services Division and local law enforcement and fire agencies.
- Partner with Community Organizations** – Maintain contact with and continue to build rapport with community-based agencies serving low-income, immigrant and refugee, and the deaf, hard of hearing, and deaf/blind communities.
- Partner with Organizations that Innovate with Special Needs Communities** – Seek out innovations that could improve the effectiveness of the E911 system for specific communities such as the deaf, hard of hearing, and deaf/blind communities by organizations such as the Technology Access Program at Gallaudet University and the Public Safety Solutions group at Avaya.
- Share Community Feedback with Other Agencies** – The public does not usually distinguish between the E911 system and the larger emergency response system. Feedback collected during community and educational outreach efforts needs to be shared with relevant agencies so they can also benefit for the information.

Measurements & Targets: Achievement of these Strategies will be measured by establishing a process of periodic reporting by the E911 Program Office on the education, outreach, coordination and innovation activities undertaken each year. This periodic reporting may include combinations of written reports and ‘dashboard’ techniques so that the 911 governance structure and the involved communities can track both year-to-year activities as well as progress over time.

Accessible and Equitable Service Objective #2 – Reducing Barriers

The E911 Program has already implemented successful mechanisms to reduce barriers for people who do not speak English to access the E911 system, and this process should continue to be managed and improved on an ongoing basis. Other barriers still exist or may emerge in the future and the E911 Program Office and the PSAPs should be engaged in an ongoing process to identify and remove barriers when possible. *(Goals: Prompt Response; No Requests Lost; Equity.)*

The following **Actions** will be taken:

- A. **Partner with PSAPs to Continue and Enhance Training for Call Takers** – The processes used for interacting with 911 callers that do not communicate verbally or in English need routine examination and refreshing. This will allow the E911 Program Office to collaborate with the PSAPs to identify and deliver training as needed to improve the overall quality of information gathered from the callers and relayed to responding emergency agencies. Evaluation of call taker service and refreshing of training materials should include consultation with communities that experience barriers to accessing 911, such as non-English speakers and deaf/hard of hearing people or organizations.
- B. **Support Access to Phone Services for Low-Income People** – The cost of cell phones and data plans can mean that low-income people do not have easy access to E911. The E911 Program Office should pursue avenues to increase access to cell phones through partnerships with other King County agencies and private and non-profit organizations.

Measurements & Targets: Achievement of these Strategies will be measured first by the E911 Program Office and the PSAPs developing the mechanisms to routinely gather the necessary feedback from these special needs communities. This process will be completed within 1 year of the adoption of this Strategic Plan. Then, in following years, the routine reporting mechanisms established within the governance structure will provide a mechanism for the Program Office to report on annual outreach and training accomplishments.

Accessible and Equitable Service Objective #3 – Modernizing Technology

Modernize technology to eliminate barriers for the deaf community in accessing 911 services. *(Goals: Prompt Response; No Requests Lost; Equity.)*

The following **Actions** will be taken:

- A. **Implement Text-to-911** – The King County E911 Program Office will continue and complete the current text-to-911 project so that all PSAPs in King County have access to this functionality. Then, as ESInet-II deployment is completed and King County implements one of the alternative architectures with full NENA i3 NG911 capabilities, continue to enhance text and related capabilities as these features become practical to implement. Organizations serving the deaf and hard of hearing community should be involved in implementing the transition to text-to-911, as well as outreach to organizations that innovate for these communities as described above.
- B. **Seek Ongoing Feedback about how E911 Technologies are Meeting Community Needs** – As NG911 technology progresses and community needs change, the E911 Program Office should implement a process for routinely gathering feedback on how these technologies are meeting the needs of communities.

Measurements & Targets: Achievement of these Strategies will be measured in three ways. First, text-to-911 services need to be implemented, and this is planned to be complete by Q1 2018. Second, within the first year of this Strategic Plan, the E911 Program Office will establish a routine process for engaging with the deaf, hard-of-hearing, and deaf/blind community to seek feedback on how this technology is meeting their needs. Third, the E911 Program Office will establish a mechanism to routinely reach out to these communities and organizations that

innovate for these communities as strategies are being developed for enhanced text-to-911 or similar accessibility strategies.

System Architecture Alternatives Review and Assessment

Insights From Other Jurisdictions

The Technology and Operations Taskforce has examined a wide variety of potential 9-1-1 system architectures that have been successfully applied to situations similar to King County's by other jurisdictions around the country. The Taskforce conducted telephone interviews with each of these organizations and collected a variety of other information on the characteristics of each jurisdiction, and then reviewed this formation over a series of several Taskforce meetings to gain a broad understanding of the architecture alternatives that could be applicable to King County's needs. The following summaries provide an overview of the insights collected by the Taskforce.

Palm Beach County, FL has a total population of just over 1.4 million in an area of almost 1,970 square miles. There are 18 PSAPs across the county, and two different 9-1-1 systems are used to meet their 9-1-1 needs. Sixteen of the PSAPs are supported by a dual-core platform architecture system with geo-diverse cores in data center environments. The two remaining PSAPs have 9-1-1 system cores located at each of their facilities and each of these systems provides backup for the other (so in essence a dual core, geo-diverse system like the one serving the other 16 PSAPs). 9-1-1 call routing services are accomplished on a carrier-provided ESInet. Palm Beach County reported that they have been well served by both of these configurations and feel they are well position for continuing evolution of NG911 capabilities.

Maricopa County, AZ has a total population almost 4.2 million in an area of approximately 9,200 square miles. There are 26 PSAPs across the county and a multi-year project is underway to migrate all of these PSAPs from their current stand-alone distributed architecture to a combination of three dual-core, geo-diverse platform architecture systems. Three systems are being utilized to distribute the overall load across multiple systems and to group PSAPs that routinely interact with one another on the same platform for enhanced interoperability. Initial 9-1-1 call routing services will be accomplished with the legacy carrier-provided selective routing systems, and migration to full ESInet capabilities will take place at some time in the future.

Denton County, TX has a total population of approximately 790,000 and the 9-1-1 program serves an area slightly larger than the county and a total of 11 PSAPs. All of these PSAPs are serviced on a single dual-core geo-diverse platform system with the cores located in data center environments. 9-1-1 call routing services are accomplished with the legacy carrier-provided selective routing systems but the platform system are ready for full ESInet call transport migration when it is deployed. This system has been in place for several years and it replaced a platform-architecture shared system that had been in place for several years before that. The county reports that the platform architecture has met their needs very well over the years.

Tarrant County, TX has a total population of approximately 2 million in an area of 864 square miles. There are 48 PSAPs across the county and two separate dual-core geo-diverse platform systems are used for their 9-1-1 services with the cores located in data center environments. Two separate systems were utilized to distribute the overall load across multiple systems and avoid the potential for all PSAPs being impacted by some problem on a single system. 9-1-1 call routing services are accomplished with legacy carrier-provided selective routing systems but the platform systems are ready for full ESInet call transport migration when it is deployed. Tarrant county is in the early stages of deploying these new systems but they report that everything is going well.

Fairfax County, VA has a total population of approximately 1.2 million in an area of 391 square miles. Virtually all 9-1-1 and dispatching services are aggregated in a single organization, with three smaller secondary PSAPs. All of the PSAPs operate on a single dual-core geo-diverse platform system with the cores located at the Primary and Backup PSAPs for the main dispatch organization. The secondary PSAPs are then networked to this platform. The county reports that this architecture has worked well for them

Thurston and Clark Counties, WA have partnered together to implement a dual-core geo-diverse system with the cores located at each of their respective countywide PSAPs. They have also established remote networking to the PSAP at Wahkiakum County so that county's 9-1-1 services don't require a stand-alone system at Wahkiakum's PSAP.

The Taskforce has steadily refined their understandings of each of these architecture alternatives and their suitability for local needs, and has ultimately identified two system architecture alternatives that could be considered for King County's long term strategic direction. Each of these alternatives would meet the Vision, Values and Goals established for the strategic planning process, and also meet the Objectives and Architecture Principles established for the Taskforce.

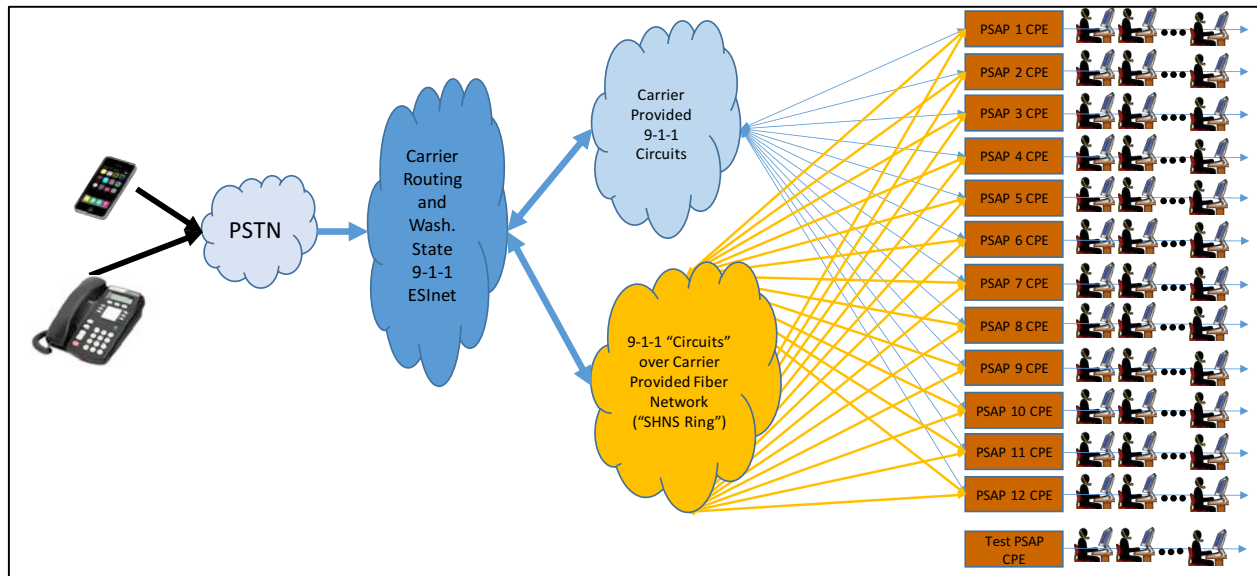
ESInet-II and System Architecture Considerations

In considering potential system architectures for King County PSAPs, the Taskforce developed an in-depth understanding of the implications of the deployment of the new ESInet-II by the State of Washington E911 Program. As discussed elsewhere in this report, this new NG911 network will provide significant enhancements in how calls are routed and transported for all PSAPs in Washington State, and provide the foundation for the migration to NG911 systems at King County's PSAPs.

The Taskforce established a series of three diagrams that help explain the migration from how calls are currently routed and transported in the current ESInet environment, and how this will change with the deployment of ESInet-II. The current call transport configuration is shown in Figure 1 below. 9-1-1 calls are currently routed to King County PSAPs over two separate networking strategies. The majority of the call traffic is routed over a digital Self-Healing Network Service (SHNS) provided by CenturyLink while a smaller volume of the traffic is routed over traditional copper circuits, referred to as CAMA² circuits. At each PSAP, the calls delivered over the SHNS network are converted to CAMA interfaces, and then all of the CAMA circuits are interfaced to the 9-1-1 telephone system at the PSAP.

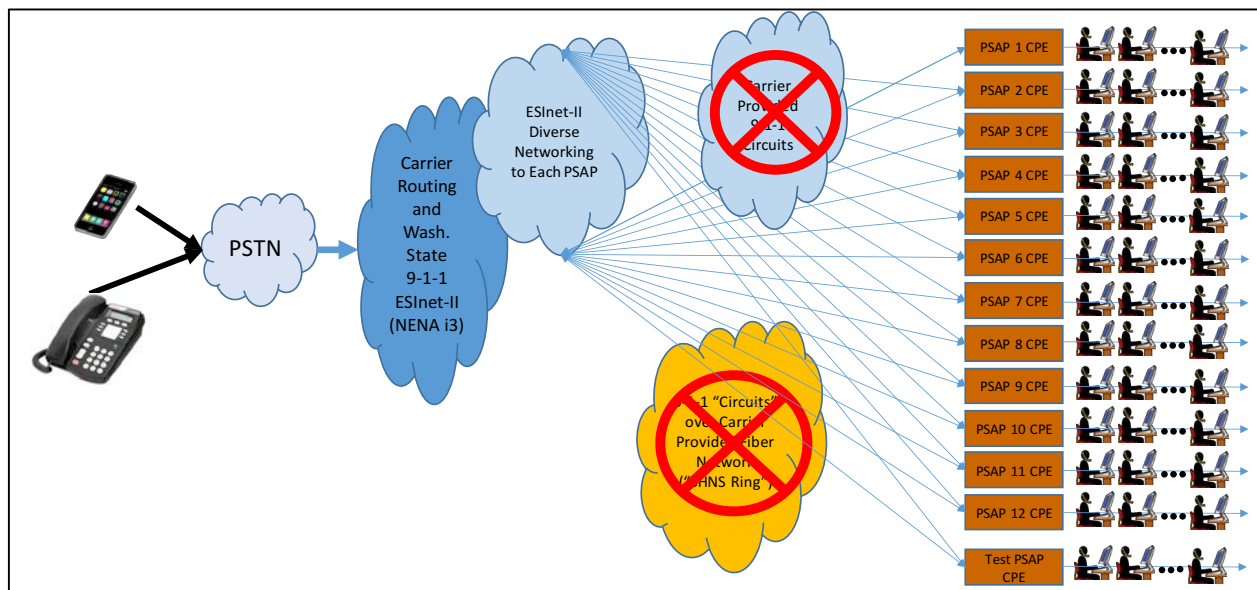
² Centralized Automatic Message Accounting (CAMA) trunks are the legacy analog technology used to convey calls from the Public Switched Telephone Network (PSTN) to the 9-1-1 PSAPs.

Figure 1 - Current Call Routing and Transport for King County PSAPs

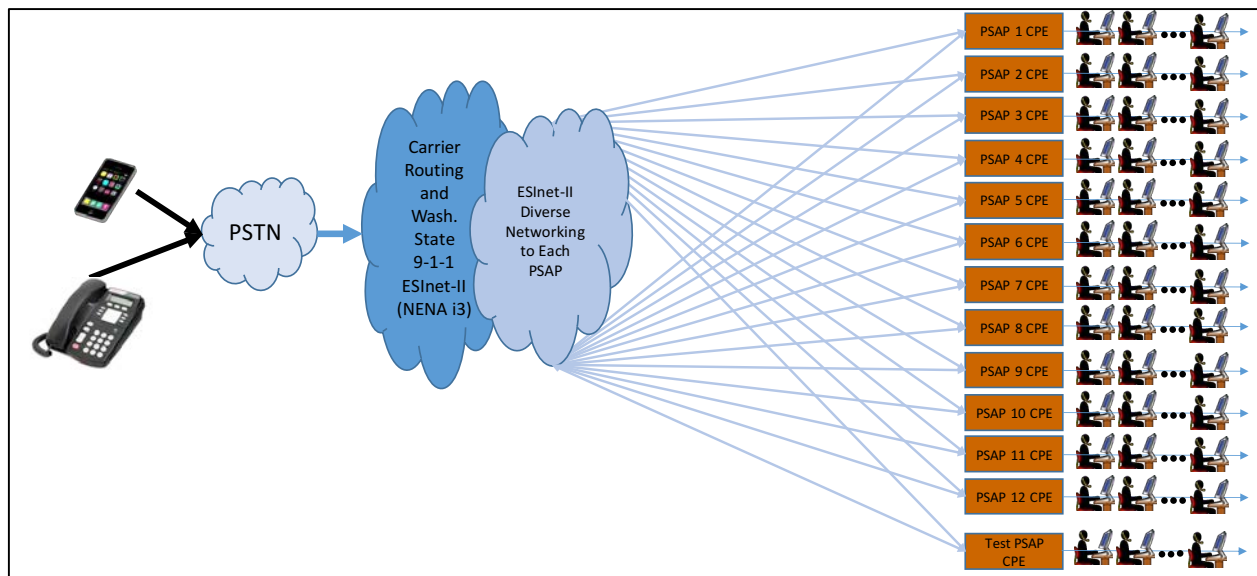


With the deployment of ESInet-II, the transport of all calls to PSAPs will be migrated to a single digital network that will be operated by the State of Washington's E911 Program Office and their vendor ComTech. This NENA i3 compliant network will have redundant and diverse-path links to each of the PSAPs in King County and fully replace the legacy CAMA circuits and eliminate the need for the SHNS digital fiber service. This transitional process is shown in Figure 2 below.

Figure 2 - New ESInet-II Replaces the Current CAMA and SHNS Networking



At the conclusion of the ESInet-II migration, 9-1-1 calls will be routed to King County PSAPs solely over the redundant ESInet-II connections, as shown in Figure 3 below.

Figure 3 - ESInet-II Networking at Completion of Migration - **King County PSAPs Still on Existing 911 Systems**

It is extremely important to note that the completion of the ESInet-II migration does not mean that King County PSAPs will have full NENA i3 NG911 capabilities. The 911 systems currently in place at King County PSAPs do not fully meet the NENA i3 NG911 standards, and therefore will not connect to the ESInet-II directly. Rather, just like is being done today, the digital ESInet-II calls will be converted to CAMA circuits at the PSAPs and these CAMA circuits will then be interfaced to the 911 system. Therefore, to complete a migration to full NG911 capabilities, King County will need to either upgrade or replace the current systems with systems that fully comply with the NENA i3 and ESInet-II standards.

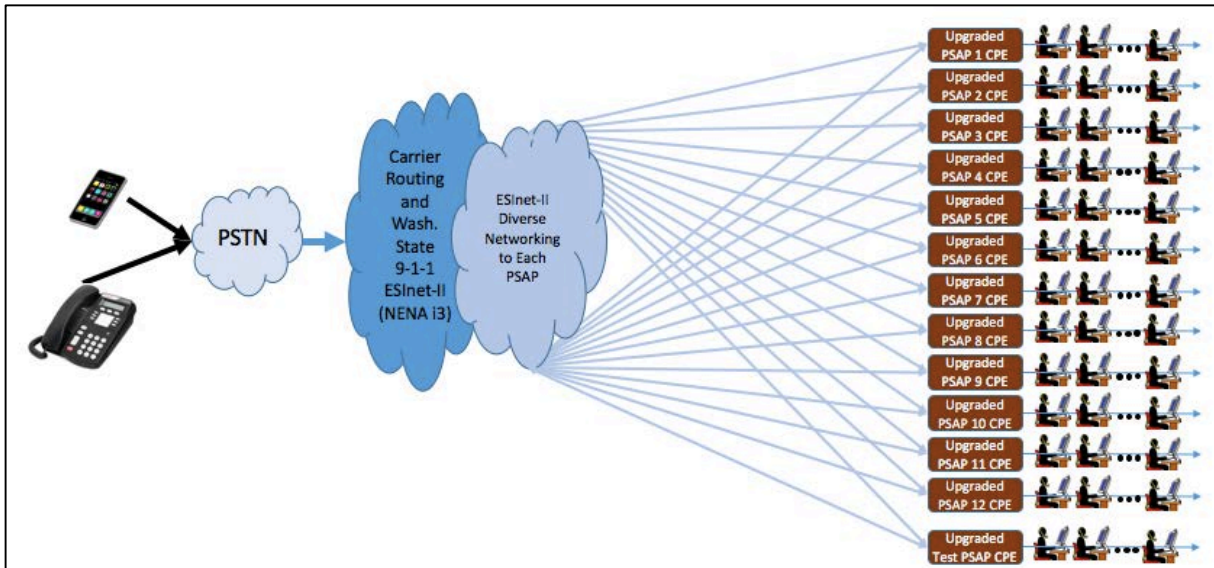
The Technology and Operations Taskforce has identified two alternative system architectures to meet this need to achieve full NG911 capabilities for King County's PSAPs.

Architecture Alternatives That Can Meeting King County's Needs

Distributed System Architecture

The first of these architectures has been identified as a Distributed System Architecture. This is the approach currently utilized in King County, with each PSAP being equipped with a 9-1-1 telephone system that is interfaced to the State of Washington's 9-1-1 backbone system. With the State's system undergoing a migration to a standards-based NENA i3 compliant architecture (being referred to as ESInet-II), King County would similarly need to migrate the PSAPs to NENA i3 compliant 9-1-1 telephone systems so that the full range of NG911 capabilities established within the ESInet-II could be utilized within King County. This architecture is shown in Figure 4 below:

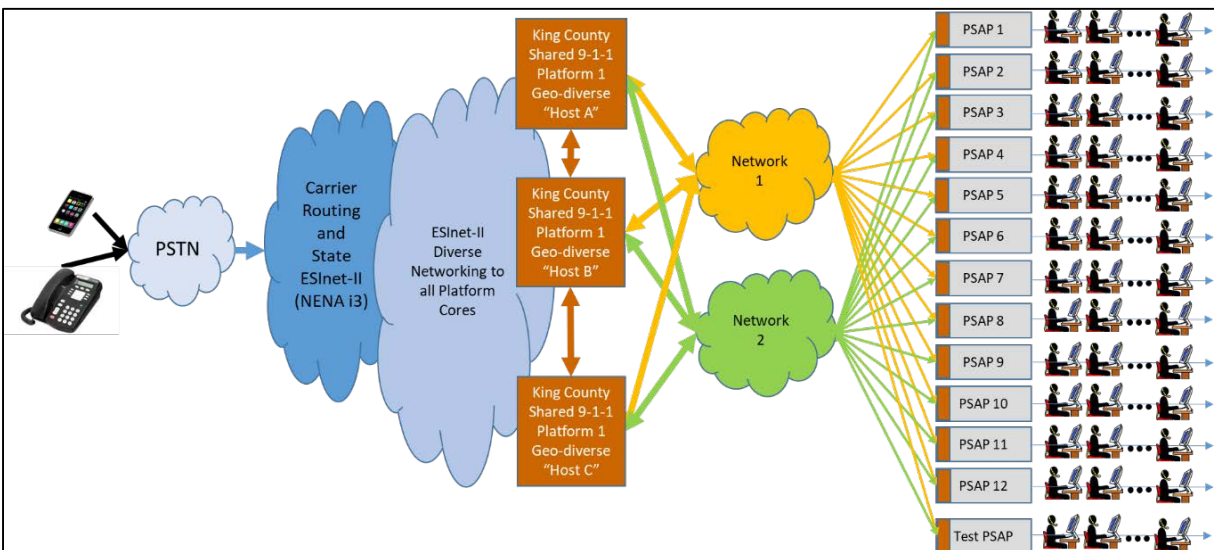
Figure 4 - Distributed System Architecture with All PSAP Systems NENA i3 and ESInet-II Compliant



Single Platform Architecture

The second of these architectures has been identified as a Single Platform Architecture. In this approach, the core elements of the 9-1-1 telephone system infrastructure are moved to a multi-node host platform. The State's ESInet-II delivers calls to this shared system platform, and the PSAPs are then networked to the platform. The platform approach also allows one of the host nodes to be located in a geographically remote location to increase system resiliency compared to having hosts only located within King County. This architecture is shown in Figure 5 below:

Figure 5 - Single Platform Architecture with All PSAP Systems NENA i3 and ESInet-II Compliant



Evaluating the Architectures Against the Principles

One layer of assessment was to take the two architectural alternatives and evaluate them for their conformance to the adopted Principles. In Table 1 below, the Taskforce compiled their evaluative observations for each architecture.

Table 1 - Alignment to Principles

Principle	Distributed Architecture	Single Platform Architecture
Public Safety	<ul style="list-style-type: none"> Meets this principle 	<ul style="list-style-type: none"> Meets this principle
Security	<ul style="list-style-type: none"> Security measures need management at each of the systems at each PSAP Version differences may create different security vulnerabilities Lower risk of a single security vulnerability impacting multiple PSAPs simultaneously since each is independent from the other 	<ul style="list-style-type: none"> System security administered at the platform level is easier to accomplish for the system as a whole, compared to stand-alone PSAP-based systems Limited physical access to platform cores provides an additional security measure Security at each PSAP still critical to protect PSAPs from each other within the shared platform network Even though interfaces still need to external systems like CAD systems, uniform interface security techniques could be applied Increased risk of a single system configuration error or security vulnerability impacting multiple PSAPs Utilizing redundant networks creates additional complexity in overall security management
Fair & Equitable	<ul style="list-style-type: none"> Accessibility features/functions need to be coordinated and implemented at each individual PSAP, increasing the complexity of planning and rolling out new capabilities Technology differences at each PSAP may create obstacles to uniform distribution of enhanced features Regional policies and coordination still needed to decide which accessibility features to implement, and when/how they would be implemented at the PSAP level 	<ul style="list-style-type: none"> Any accessibility feature or function implemented within the system is then available to all PSAPs consistently Regional policies and coordination still needed to decide which accessibility features to implement, and when/how they would be implemented at the PSAP level
Cost Effectiveness	<ul style="list-style-type: none"> CAPEX and OPEX replicated at each PSAP Rolling out features and functions requires considerable personnel resources and coordination to perform this work at each individual PSAP Even if a single vendor utilized, administering that vendor's services across 13 individual systems would be more complex than with the platform approach 	<ul style="list-style-type: none"> Reduces the level of CAPEX and OPEX in the core 9-1-1 telephone system equipment but may increase networking costs Cost effectiveness needs to be measured across a multi-year migration cycle so that economic value of current systems is realized Vendor services management easier to administer with fewer cores than with distributed approach

Principle	Distributed Architecture	Single Platform Architecture
	<ul style="list-style-type: none"> State pays for ESInet-II networking all the way to the PSAPs 	<ul style="list-style-type: none"> State only pays for ESInet-II networking to the platform cores and networking from the cores to the PSAPs becomes a local responsibility
Capacity	<ul style="list-style-type: none"> Capacity management is largely at a PSAP level, but challenging to establish regional strategies for capacity management with each PSAP its own stand-alone system ESInet-II Policy Routing Function will create some increased flexibility to manage capacity regionally Broadening call routing configurations may create call processing challenges since each PSAP operates their own CAD system 	<ul style="list-style-type: none"> All PSAPs on a single platform could increase the regional flexibility to react to call volume surges and capacity challenges impacting multiple PSAPs Capacity across redundant networks needs to be planned to accommodate traffic surges as well as network failures Opportunities may exist to leverage combinations of carrier and local governmental networks for the networking between the platform cores and the PSAPs
Availability	<ul style="list-style-type: none"> From a regional perspective, high availability due to distributed architecture supported by diverse-path ESInet-II networking System malfunctions at a single PSAP unlikely to cause malfunctions at any other PSAPs 	<ul style="list-style-type: none"> Geo-diverse cores reduce single-point failure risks Geo-diversity of cores expanded outside of King County reduces risks from a large-scale seismic event Platform-level failures or configuration errors could adversely impact multiple (or all) PSAPs Redundancy and diversity of networking (at the physical and technological levels) is needed to assure connectivity to PSAPs
Interoperability	<ul style="list-style-type: none"> Compatibility and compliance with ESInet-II interface requirements need to be met at each PSAP Ability to transfer or manage 9-1-1 calls between PSAPs is limited to “9-1-1 transfers” through ESInet-II 	<ul style="list-style-type: none"> Compatibility and compliance with ESInet-II interface requirements need only be done at the platform level. Being on a shared platform makes it easier to establish a variety of call transfer or other call management characteristics that could increase interoperability and flexibility between the PSAPs beyond what is capable through ESInet call transfers. This flexibility could also apply to 10-digit and ring-down lines creating more flexibility in how PSAPs plan and execute backup relationships Interop with the ESInet-II and out-of-county PSAPs would only need to be configured and administered at the platform level Redundant networking may create interop opportunities for other systems
Convergence	<ul style="list-style-type: none"> Continuing the practice of using a common PSAP equipment vendor for all PSAPs creates a level of convergence from an operational capability perspective 	<ul style="list-style-type: none"> This would be the most ‘converged’ of all the alternatives, with all PSAPs on a single shared system Operating on a shared system can create situations where a system patch, upgrade

Principle	Distributed Architecture	Single Platform Architecture
		<p>or enhancement creates changes in how various features, functions or interfaces work, requiring careful coordination with all PSAPs as upgrades are being planned and implemented</p> <ul style="list-style-type: none"> • Redundant networking may create other convergence opportunities

With these evaluative observations mutually agreed to by the Taskforce members, the group then went through a process of evaluating the two alternatives against each other in the degree to which the Principles would be met if this alternative were implemented. The results of that process are shown in Table 2 below. In this table, if an architecture is judged to meet the Principle a √ mark is shown. If the architecture is judged to have exceeded the Principle or meets the Principle in some manner that is better than the other alternative a √+ mark is shown.

Table 2 - Comparison of the Alternatives for Each Principle

Principle	Alt 1 – Distributed Architecture	Alt 2 – Single Platform
Public Safety	√+	√+
Security	√	√+
Fair and Equitable	√	√+
Cost Effective		
Capacity	√	√+
Availability	√+	√+
Interoperability	√	√+
Convergence	√	√+

Advantages and Disadvantages of Each Alternative

The Taskforce also went through a process of characterizing the Advantages and Disadvantages of each of the architectural alternatives. These characterizations are provided in Tables 3 and 4 below:

Distributed Architecture

- E911 telephone equipment (PSAP CPE) resides at each PSAP serving that PSAP. King County E911 Program responsible for PSAP CPEs.
- ESInet-II, Washington State’s NG-911 network, delivers calls to PSAP CPEs using diverse paths to each PSAP. State covers networking costs and accountable for call delivery.
- Requires investment to upgrade or replacement PSAP CPEs to meet ESInet-II and NENA i3 (NG911 technical standard) requirements.

Table 3 - Distributed Architecture - Advantages and Disadvantages

Advantages or Beneficial Characteristics	Disadvantages or Adverse Characteristics
<ul style="list-style-type: none"> • Self-sufficient PSAPs – Each PSAP has a stand-alone E911 telephone system that is directly linked to the ESInet, so a failure at any individual PSAP remains isolated to that PSAP and has limited or no impact on overall countywide 9-1-1 availability at the other PSAPs • PSAP Flexibility – Each PSAP can be specifically configured as needed to interface to the PSAPs administrative phone system. Each PSAP customizes phone and operations per business needs of that PSAP. Control of changes driven by PSAPs needs. • Network Simplicity – The State would manage diverse networking to each of the PSAPs, allowing King County resources to be focused on the PSAP telephone and supporting systems (mapping, NG911 capabilities, etc.) State is accountable for 911 call delivery to PSAPs. • Known – Current practice of having full E911 phone systems at each PSAP and current roles and responsibilities between PSAPs and E911 Program would be continued. 	<ul style="list-style-type: none"> • Increased Security Complexity – Managing version, patch and security updates is complex and requires considerable staff-time when spread across multiple PSAPs. • Limited Interoperability – Interoperability – the ability to connect systems, exchange data and connect operations - between PSAPs limited to 911 call transfers back through the ESInet to other PSAPs. • More Complex Migration to NG911 – Implementation of NG911 capabilities needs to be accomplished on a PSAP-by-PSAP basis. • Routine Maintenance Challenges – Multiple phone systems at various stages of their lifecycles creating challenges with interfaces, security and routine upgrades. • Duplicated System Costs – Each PSAP requires investment in E911 phone system equipment that isn’t proportional to the number of positions operating at that PSAP.

Advantages or Beneficial Characteristics	Disadvantages or Adverse Characteristics
<ul style="list-style-type: none"> • Networking Cost Savings – The State covers the cost of ESInet-II networking all the way to each PSAP. • Call Routing & Backup – ESInet-II will create enhanced call routing flexibility between PSAPs to help manage capacity constraints or deal with failover conditions. 	

Single Platform Architecture

- E911 telephone equipment (PSAP CPEs) move from PSAPs and centralized into three (at minimum) geographically diverse platform cores, with one core potentially outside of Western Washington. Network switch remains at PSAPs to interface with cores, and King County responsible for platform cores and switches.
- State's ESInet-II network delivers calls to the cores, and King County responsible for network to deliver calls to PSAPs.
- Requires investment to implement platform cores, network switches at PSAPs and network connectivity from E911 platform cores to PSAPs.

Table 4 – Single Platform - Advantages and Disadvantages

Advantages or Beneficial Characteristics	Disadvantages or Adverse Characteristics
<ul style="list-style-type: none"> • Potentially Lower Equipment Costs – May provide opportunities to lower overall one-time and on-going costs for the platform core equipment by reducing number of E911 phone systems overall. • Increased Resiliency – If core diversity can include locating equipment outside the Puget Sound area (like Eastern Washington) there is a lower potential for a single seismic event to render the system inoperable. • Ease of System Management – Easiest to manage and roll-out new capabilities, and once rolled out they are available to all PSAPs. Also, logistically easier to manage vendor performance, upgrades, patching and system monitoring. • Increased Security – Easier to monitor system security and physical access with 	<ul style="list-style-type: none"> • Higher Network Costs – Equipment cost savings likely to be offset by increases in costs for highly reliable networking connectivity from platform cores to PSAPs. • Higher Impacts from Platform Failures – While risk is minimal because of redundant and geographically diverse cores, a major hardware or software failure or configuration management error may impact multiple (or all) PSAPs. • Maintenance and Troubleshooting Challenges – With one of the cores located remote from King County, this increases the complexity of performing routine maintenance/upgrades or responding to major system issues if physical presence required.

Advantages or Beneficial Characteristics	Disadvantages or Adverse Characteristics
<p>fewer nodes and security resources can focus efforts to keep core systems protected.</p> <ul style="list-style-type: none"> • Capacity Management– Increased flexibility to manage call volume surges and/or backup strategies between PSAPs within a shared system. • Consistency Across PSAPs – Any accessibility or NG911 capability is made available consistently and evenly to all PSAPs. Changes at the core can affect all PSAPs simultaneously. • Future Flexibility – New capabilities available, such as ability to create virtual or mobile PSAPs off the shared cores, new communications modes such as instant messaging or text, etc. Can also create more flexibility in how 10-digit or ring-down lines are managed within the system, which could be advantageous to PSAPs in planning and executing backup relationships. 	<p>Troubleshooting call delivery issues will also involve State and King County.</p> <ul style="list-style-type: none"> • Governance – With PSAPs on a shared system, high levels of governance and change management process will be needed so that system changes are well understood at all the PSAPs and any operational impacts can be well considered in advance of any system changes.

As a final step, the Taskforce considered all the Advantages and Disadvantages of each of the alternatives and identified the three most important items for each alternative. These results are shown in Table 5 below:

Table 5 - Top 3 Advantages and Disadvantages for Each Architecture Alternative

Distributed	Single Platform
<u>Advantages</u> <ul style="list-style-type: none"> • PSAP Flexibility • Self-Sufficient PSAPs • Network Cost Savings 	<u>Advantages</u> <ul style="list-style-type: none"> • Increased Security • Ease of System Management • Increased Resiliency
<u>Disadvantages</u> <ul style="list-style-type: none"> • Increased Security Complexity • Routine Maintenance Challenges • Duplicated System Costs 	<u>Disadvantages</u> <ul style="list-style-type: none"> • Higher Network Costs • Higher Impacts from Platform Failure • Maintenance and Troubleshooting Challenges

Potential Timelines

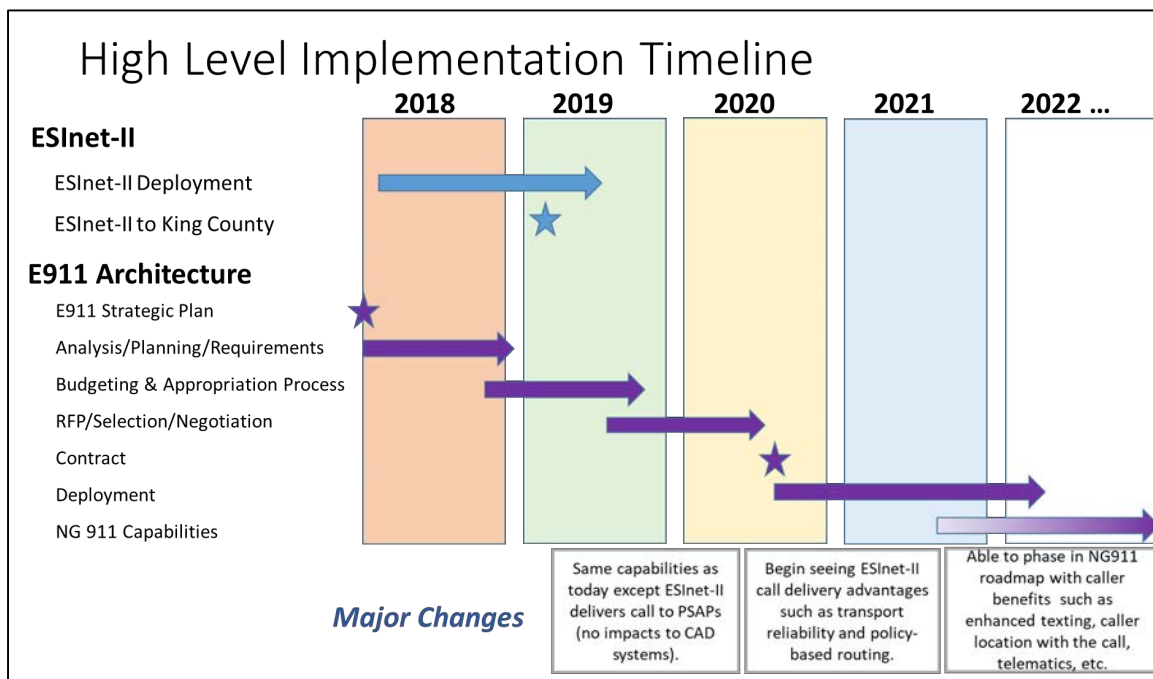
It is important to remember that as the State completes the deployment and cutover to ESInet-II call routing and transport to the PSAPs, this does not mean that Alternative 1 – Distributed Architecture has been implemented. As ESInet-II transition completes in late 2018 or early 2019, the NENA i3 call delivery mechanism will be used to bring the 9-1-1 call to the PSAP and then a conversion will be made to CAMA interfaces to the existing CPE (just like it is today for the calls arriving over the IP SHNS service).

King County would still need to make a conscious choice on how it wanted to reach full NENA i3 NG911 capability, by either upgrading or replacing the current systems at each of the PSAPs (the Distributed Architecture alternative) or by migrating to the Single Platform alternative. Either of these paths would involve its own implementation timeline including RFI/RFP processes followed by contract negotiations, detailed design, installation, testing, training and cutover processes.

Regardless of the architecture selected, the role of the E911 Program Office would likely stay the same as it is today, or even expand as Program Office resources, or PSAP personnel paid for out of E911 revenues, take on larger roles in Tier 1 and Tier 2 support of the NG911 systems, features and functions.

A high-level implementation timeline is provided in Figure 6 below.

Figure 6 - High Level Implementation Timeline



Cost Estimates for the Architecture Alternatives

In an effort to understand the potential costs for acquiring and implementing either of these architectural alternatives, the Taskforce conducted a round of outreach with the community of vendors to offer these types of systems. The goal of this work was to determine the potential range of both capital acquisition expenses (CAPEX) and ongoing operational expenses (OPEX) for each of the alternative architectures. Information was also gathered on the nature of the networking and bandwidth requirements needed for the Platform Architecture so that networking cost estimates could also be developed. A total of four system vendors provided information for this process.

From a CAPEX perspective, the Platform Architecture would be slightly less expensive, with total costs between 7% and 10% lower compared to the Distributed Architecture, or an overall CAPEX savings of between \$545,000 and \$843,000. Tables 6 and 7 below show the lowest and highest cost estimates provided, and the mean and median values across the estimates provided.

Table 6 - Distributed Architecture Estimated CAPEX

Distributed Architecture CAPEX Cost Estimates (with tax)					
		Lowest Cost Estimate	Highest Cost Estimate	Mean of Cost Estimates	Median of Cost Estimates
PSAP 1	Enumclaw Police Department	\$ 96,010	\$ 147,424	\$ 127,366	\$ 138,665
PSAP 2	UW Police Department	\$ 72,008	\$ 110,568	\$ 95,525	\$ 103,999
PSAP 3	Issaquah Police Department	\$ 96,010	\$ 147,424	\$ 127,366	\$ 138,665
PSAP 4	Bothell Police Department	\$ 144,016	\$ 221,136	\$ 191,049	\$ 207,997
PSAP 5	Port of Seattle Police Department	\$ 192,021	\$ 294,847	\$ 254,733	\$ 277,329
PSAP 6	Redmond Police Department	\$ 456,050	\$ 700,263	\$ 604,990	\$ 658,657
PSAP 7	Washington State Patrol - Bellevue	\$ 240,026	\$ 368,559	\$ 318,416	\$ 346,662
PSAP 8	NORCOM	\$ 552,060	\$ 847,686	\$ 732,356	\$ 797,322
PSAP 9	Seattle Fire Department	\$ 672,073	\$ 1,031,966	\$ 891,564	\$ 970,653
PSAP 10	King County Sheriff's Office	\$ 744,081	\$ 1,142,534	\$ 987,089	\$ 1,074,651
PSAP 11	Valley Com	\$ 1,224,133	\$ 1,879,653	\$ 1,623,920	\$ 1,767,975
PSAP 12	Seattle Police Department	\$ 1,056,115	\$ 1,621,661	\$ 1,401,029	\$ 1,525,312
PSAP 13	Test PSAP	\$ 120,013	\$ 184,280	\$ 159,208	\$ 173,331
Totals		\$ 5,664,618	\$ 8,698,000	\$ 7,514,611	\$ 8,181,217
Per Workstation Average Overall Cost				\$ 31,842	\$ 34,666

Table 7 - Platform Architecture Estimated CAPEX

Single Platform Architecture CAPEX Cost Estimates (with tax)					
		Lowest Cost Estimate	Highest Cost Estimate	Mean of Cost Estimates	Median of Cost Estimates
PSAP 1	Enumclaw Police Department	\$ 89,108	\$ 140,898	\$ 118,126	\$ 124,372
PSAP 2	UW Police Department	\$ 66,831	\$ 105,674	\$ 88,595	\$ 93,279
PSAP 3	Issaquah Police Department	\$ 89,108	\$ 140,898	\$ 118,126	\$ 124,372
PSAP 4	Bothell Police Department	\$ 133,662	\$ 211,347	\$ 177,189	\$ 186,558
PSAP 5	Port of Seattle Police Department	\$ 178,217	\$ 281,797	\$ 236,252	\$ 248,743
PSAP 6	Redmond Police Department	\$ 423,264	\$ 669,267	\$ 561,099	\$ 590,766
PSAP 7	Washington State Patrol - Bellevue	\$ 222,771	\$ 352,246	\$ 295,315	\$ 310,929
PSAP 8	NORCOM	\$ 512,373	\$ 810,165	\$ 679,225	\$ 715,137
PSAP 9	Seattle Fire Department	\$ 623,758	\$ 986,288	\$ 826,883	\$ 870,602
PSAP 10	King County Sheriff's Office	\$ 690,589	\$ 1,091,962	\$ 915,477	\$ 963,881
PSAP 11	Valley Com	\$ 1,136,130	\$ 1,796,453	\$ 1,506,108	\$ 1,585,739
PSAP 12	Seattle Police Department	\$ 980,191	\$ 1,549,881	\$ 1,299,387	\$ 1,368,089
PSAP 13	Test PSAP	\$ 111,385	\$ 176,123	\$ 147,658	\$ 155,465
Totals		\$ 5,257,388	\$ 8,313,000	\$ 6,969,439	\$ 7,337,930
		Per Workstation Average Overall Cost		\$ 29,532	\$ 31,093
		Cost Savings Compared to Distributed Architecture		7.3%	10.3%
		Cost Savings Compared to Distributed Architecture		\$ 545,172	\$ 843,286

Similarly, from an OPEX perspective, the Platform Architecture had slightly lower estimated maintenance costs of approximately 10% to 12%. Across a 10-year operational model this could result in a savings of between \$583,000 and \$712,000. Annual savings though are relatively small, with the median cost estimate difference for the first year of maintenance being only approximately a \$37,000 savings. Tables 8 and 9 below show the lowest and highest cost estimates provided, and the mean and median values across the estimates provided.

Table 8 - Distributed Architecture 10-year OPEX Estimates

Annual Vendor O&M and Tech Refresh Costs for Distributed Architecture				
	Low	High	Mean	Median
Year 1	0	0	\$ -	\$ -
Year 2	\$ 253,981	\$ 467,665	\$ 369,164	\$ 385,846
Year 3	\$ 261,601	\$ 481,695	\$ 376,381	\$ 385,846
Year 4	\$ 269,448	\$ 496,146	\$ 383,813	\$ 385,846
Year 5	\$ 277,532	\$ 511,030	\$ 391,469	\$ 385,846
Year 5 Tech Refresh	\$ 1,104,400	\$ 961,400	\$ 1,009,067	\$ 961,400
Year 6	\$ 285,858	\$ 526,361	\$ 418,647	\$ 443,723
Year 7	\$ 294,434	\$ 542,152	\$ 426,769	\$ 443,723
Year 8	\$ 303,267	\$ 558,416	\$ 435,135	\$ 443,723
Year 9	\$ 312,365	\$ 575,169	\$ 443,752	\$ 443,723
Year 10	\$ 321,736	\$ 592,424	\$ 452,628	\$ 443,723
Year 10 Tech Refresh	\$ 1,270,060	\$ 1,105,610	\$ 1,160,427	\$ 1,105,610
10-Year Total Support Costs	\$ 4,954,682	\$ 6,818,068	\$ 5,867,252	\$ 5,829,008

Table 9 - Platform Architecture 10-year OPEX Estimates

Annual Vendor O&M and Tech Refresh Costs for Single Platform Architecture				
	Low	High	Mean	Median
Year 1	0	0	\$ -	\$ -
Year 2	\$ 208,680	\$ 446,490	\$ 334,690	\$ 348,899
Year 3	\$ 214,940	\$ 459,885	\$ 341,241	\$ 348,899
Year 4	\$ 221,389	\$ 473,681	\$ 347,990	\$ 348,899
Year 5	\$ 228,030	\$ 487,892	\$ 354,940	\$ 348,899
Year 5 Tech Refresh	\$ 739,000	\$ 961,400	\$ 769,933	\$ 739,000
Year 6	\$ 234,871	\$ 502,528	\$ 379,544	\$ 401,234
Year 7	\$ 241,917	\$ 517,604	\$ 386,918	\$ 401,234
Year 8	\$ 249,175	\$ 533,132	\$ 394,514	\$ 401,234
Year 9	\$ 256,650	\$ 549,126	\$ 402,337	\$ 401,234
Year 10	\$ 264,350	\$ 565,600	\$ 410,395	\$ 401,234
Year 10 Tech Refresh	\$ 849,850	\$ 1,105,610	\$ 1,033,007	\$ 1,105,610
10-Year Total Support Costs	\$ 3,708,852	\$ 6,602,949	\$ 5,155,508	\$ 5,246,374
Cost Savings Compared to Distributed Architecture			12.1%	10.0%
Cost Savings Compared to Distributed Architecture			\$ 711,744	\$ 582,634

Implications of Networking Costs

One additional cost element needs to be factored into the comparison of the two architectural alternatives, the cost of providing the networking to the individual PSAPs. In the Distributed Architecture, this networking is provided by the State E911 Program as a part of their deployment and operation of the ESInet-II. Therefore, the networking cost to King County for the Distributed Architecture is “free”.

This is not the case for the Platform Architecture because the State considers its ESInet-II responsibilities ending at the platform cores. Therefore, King County’s total cost model must also take into consideration the cost of networking from the platform cores to the PSAPs themselves. There are two reference points for estimating what these costs may be:

1. First, King County currently acquires SHNS service from CenturyLink in their current networking design. This network is essentially the same configuration needed for the Platform Architecture (fiber ring reliability connected to two host locations with dual connections to each PSAP). This service is currently costing \$738,000 per year. Once modified to include 3 host locations and some increased bandwidth to PSAPs (depending on the specific vendor’s specs), the annual cost would likely be slightly higher, so an annual cost estimate of \$750,00 could be inferred.
2. Second, the State’s ESInet-II vendor has also developed a networking cost estimate for the Platform Architecture at \$_____ per year.

[insert a final paragraph or two that describe the 10-year total cost comparisons using the lowest of the networking costs]

Exhibit A – Architectural Principles

1. The Public Safety Principle - *We should ensure service exists that protects the public's safety above all else.*

We need to balance a number of factors when designing and operating a E911 system. However, our highest priority is to ensure adequate service exists to protect the public and responders.

Rationale: It is important to understand the current issues and factors that are shaping both the demand for E911 services within the service area, as well as the factors affecting the technologies themselves. However, protecting the public and responders is our highest priority.

Implications: Not all technology strategies can be evaluated using traditional cost benefit analysis (CBA) criteria. There will be times when other factors such as public safety that need to be considered as priority in resolving a decision.

2. The Security Principle - *All systems and solutions will need to meet at least the minimum level of security defined.*

The security of our systems will only be as strong as the weakest link. Therefore, we will include all components and approaches that can affect security in the system design.

Rationale: There are costs associated with making systems secure. And though we need to balance cost and effectiveness, security must meet a minimum acceptable level so as to not risk the ability to provide secure public safety communication

Implications: Minimum security standards will need to be defined for our systems based on the needs of all jurisdictions in the coverage area. These standards should include federal guidelines if they exist. Further, all services must adhere to those standards including vendor managed services. Finally, security plans need to include all aspects of the system design that need to be protected. This includes not just the E911 systems themselves, but supporting assets, and vendor managed components of the system

3. The Fair and Equitable Principle - *We should seek to provide a fair and equitable access so that all communities can receive and perceive value.*

We will balance the value of emerging and next generation technologies to the E911 program and the PSAPS with the value to the various communities in the region. This will mean considering the ability of residents to utilize and access E911 services.

Rationale: While no one questions the need for public safety, we need to make sure that King County residents have the ability to access E911 services as technology advances and next generation solutions are considered.

Implications: The Equity and Social Justice (ESJ) lens needs to be applied to all new technologies that are considered. Solution costs and benefits will need to be viewed from

all perspectives, and we need to understand the impact of solutions to the various communities and their ability to utilize the technology solutions. We will also balance cost-effective solutions with state-of-the-art solutions.

4. The Cost Effectiveness Principle - *Financial decisions should be based on the most cost-effective solutions consistent with documented needs.*

Rationale: The public's tax dollars should be spent as wisely as possible.

Implications: When two solutions meet needs equally well, the lower cost solution should be selected. When one higher cost solution meets our needs and one lower cost solution does not meet our needs, those solutions should not be seen as equivalent. Costs should be calculated as long-term total costs.

The System will be developed in a manner that maximizes the price advantages realized in large-scale and long-term purchasing agreements. It is expected to demonstrate the wisest possible use of taxpayer dollars when compared to other E911 systems, and to realize the benefits of improved public safety communications for all county residents. Needs should be based on data whenever possible.

5. The Capacity Principle – *The capacity of the system should be designed to meet peak demands without service interruption.*

Public Safety systems must have enough capacity not only to meet average daily demands, but to meet peak demands when they are needed most

Rationale: Providing capacity that does not strive to meet peak demands can put lives at risk

Implications: Systems should be scaled to meet peak capacity and modeling should be used to predict demand. Capacity planning should take into account growth in population and the ability of the E911 technology architecture to scale to the anticipated growth. Whenever possible, we will design systems with the ability to flexibly scale on demand, as opposed to building a static capacity of the maximum expected usage.

6. The Availability Principle - *Solutions should be available at all times without service interruption*

Systems should be designed, operated, and maintained to be available 100% percent of the time within the coverage area as feasible.

Rationale: The amount of time a public safety solution is unavailable is directly proportional to the increased risk to lives and property.

Implications: Reliability needs to be a high priority in the design, operation, and maintenance of a system and solutions should be design with no single point of failure. System designs should include mechanisms that allow failover of a key component without interrupting service. Systems should be appropriately monitored, including mechanisms to alert of possible failure or service degradation conditions. Systems must be properly

maintained utilizing industry best operational practices and standards. There must be standards for system and subsystem performance and performance should be regularly reported.

7. The Interoperability Principle - *Software and hardware should conform to defined standards that promote interoperability for data, applications, and technology.*

Rationale: Standards help ensure consistency, thus improving the ability to manage systems and improve user satisfaction, and protect existing IT investments, thus maximizing return on investment and reducing costs. Standards for interoperability additionally help ensure support from multiple vendors for their products, and facilitate supply chain integration.

Implications: Interoperability standards and industry standards will be followed unless there is a compelling business reason to implement a non-standard solution. A Governance process for setting standards, reviewing and revising them periodically, and granting exceptions must be established. The existing IT platform and supporting technology must be identified and documented.

8. The Convergence Principle - *We should converge toward common solutions, approaches, and standards.*

The design of our solutions and approaches should move us toward common technologies and ways of doing business that enhance our ability to provide service and leverage economies of scale whenever possible.

Rationale: We are better stewards of the taxpayers' money when we are not expending extra resources to integrate dissimilar solutions in order to interoperate. Our ability to interoperate is maximized when we have similar solutions and standards

Implications: Convergence points between partners that make up the E911 program and service need to be identified and mapped into a multi-year roadmap. Adherence to Federal and State standards and guidelines will provide increased convergence opportunities. Opportunities beyond technologies and standards should be explored – for example, shared purchasing and provisioning could yield economies of scale.



Executive Summary

Introduction and Summary of Key Recommendations

The Finance Task Force is pleased to submit its recommendations for a 10-year Sustainable Finance Plan for the King County E911 Program Office. All participants in this process worked hard to be open, transparent, honest, and collaborative. Notably, the E911 Program Office is making improvements to the E911 accounting and financial planning procedures. Further, they have made significant progress on the Task Force's Guiding Principles adopted by the Leadership Group in June 2017. The findings in this report are the result of this collaborative and transparent effort by King County, Program Office and PSAP representation on the Task Force.

However, the E911 Program is at a critical crossroads and the Task Force believes significant policy and financial maneuvers are needed immediately to place the program and its services on the path towards fiscal sustainability. **As the IAG efforts conclude at the end of 2017, the Finance Task Force believes the Program Office should continue its collaborative efforts with PSAPs through the Program Office and Governing entity and implement cost saving actions by the end of 2018 and recommend revenue action to the KC Council during the same time period as outlined in this report.**

In summary, there are two critical issues that must be addressed. The Finance Task Force believes these issues must be resolved within the next year.

Current levels of spending are not sustainable and PSAPs and the Program Office must share in the responsibility to cut costs to more sustainable levels.

Outside of the need to update the technology architecture with new ESINetII capabilities, the Program Office and PSAPs need to work together over the next year to complete the following recommendations summarized in the executive summary and discussed in more detail in the body of the report. These recommendations seek to balance the impacts between the Program Office and PSAPs, could be more easily absorbed by both parties, and provide more breathing room before future negative fund balance occurs so that a workable revenue strategy can be deployed.

The recommendations include work in the following key areas:

- Finding the most operationally efficient staffing levels for Program Office funded FTEs at both the Program Office and PSAPs.
- Working with PSAPs to lower escrow distributions to more financially sustainable levels.
- Continuing to improve financial policies, processes and transparency.

Revenues are not keeping pace with inflation or needed expenses and revenue reforms are needed.

Demonstrating that the most cost-efficient and accountable spending is in place is important to make the case that new revenues are needed. The Task Force believes its recommendations in

that regard will help prove that issue out. The King County E911 System faces a structural issue related to the adequacy of funding. Work needs to begin immediately to deliver options to the King County Council to find a more adequate, resilient, tax base to support the nature of this safety system. Revenue is forecasted to be relatively flat through 2026. Revenue has not increased since the excise tax increase in 2011. It is clear to the Task Force that the tax base and tax policy that supports program revenues have not kept pace with inflation, much less the cost of labor and technology.

Summary of Key Findings

The E911 Finance Task Force was convened in August 2016 and charged with the research, deliberation, and recommendation of a 10-year Sustainable Financial Plan for the Regional E911 System. After 12 months of meetings, research, and discussion, the Finance Task Force submits the following set of considerations and recommendations to the Planning Group for review and discussion.

The Task Force believes that further substantive progress needs to be made in the coming years in order to address a multi-dimensional set of investment, operational and, financial challenges. In developing the 10-year Sustainable Financial Plan, the Finance Task Force makes the following set of findings:

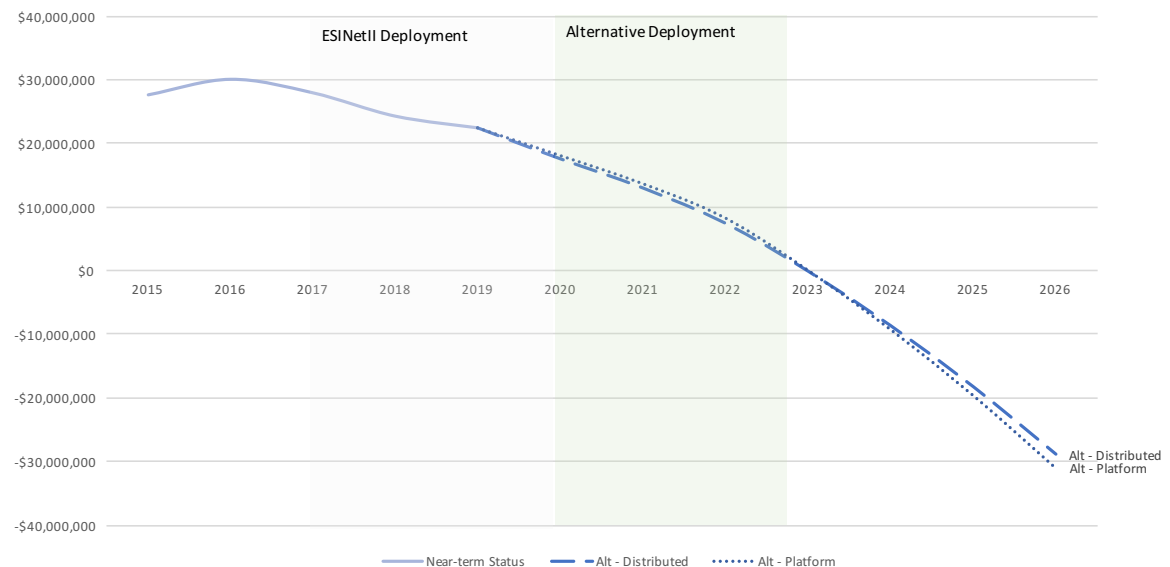
- E911 Excise Tax supports E-911 related services and technology that is delivered by both the King County E911 Program Office and the PSAPs. Investing and maintaining the system has been a regional partnership, backed with financial resources from the E911 Excise Tax and from the local governments.
- The Technology & Operations Task Force explored two possible System Architecture choices, then worked with the Finance Task Force to analyze their financial impact. The Distributed architecture option is slightly more expensive to deploy, but somewhat less expensive over the 10-year planning period due to higher networking costs of the Platform architecture. The Distributed architecture equipment and maintenance is over the 10-year period ending in 2026 (assumes new platform in 2020), the Distributed architecture is estimated to cost approximately \$2 million less. On a total cost of ownership perspective (10 years of ownership, from 2020-2030), the Distributed architecture is estimated to cost approximately \$5 million less as shown in the Exhibit below. This conclusion assumes constant technology staffing levels at the PSAPs, and does not include potential cost and time efficiencies in system upgrades with the Platform alternative. These estimates will follow during implementation planning.

Exhibit 1: Comparison of System Architecture Costs

	Alt 1 – Distributed Architecture	Alt 1 – Platform Architecture
One-Time System Implementation Costs (CAPEX)	\$8,181,217	\$7,337,930
Annual System Maintenance Costs (OPEX) - first year	\$385,846	\$348,899
10-year OPEX (incl. refresh x 2)	\$5,829,008	\$5,246,374
Annual Networking Costs	\$0	\$700,000
10-year Networking Costs	\$0	\$7,000,000
Total: 10-year Cost of Ownership	\$14,010,225	\$19,584,304

Note: CAPEX and OPEX system costs based on median of cost estimates received. Networking costs is a placeholder for the two networks for Single Platform (pending vendor estimate is likely to be lower).

- Projected levels of expenditures will outpace revenues and lead to a negative fund balance in the near future – currently estimated to be in 2023. A new system architecture improves the financial position of the office by bringing in cost-efficiencies, yet at this stage of the strategic planning process neither system architecture choice presents a large material difference in the overall financial picture of the E911 System. Based on preliminary cost estimates, a Distributed architecture cost marginally less on a total cost of ownership basis; however, the difference is relatively small as percent of total program expenditures. However, the process is ongoing within the Program Office to define the operational savings between the two alternatives and it is likely that the Platform system will have the need for fewer technology professionals thereby reducing its overall cost.

Exhibit 2: Comparison of Ending Fund Balances of System Architectures

Note: ESINetII is assumed to deploy through 2019 with System Architecture deployment in 2020 and completed by 2023.

- The tax base and tax policy that supports program revenues has not kept pace with inflation much less the cost of labor and technology. The King County E911 System faces a structural issue related to the adequacy of funding.

- As the Program Office and System Governance entity plans for a new technology system, they will need to evaluate some areas of financial uncertainty - specifically: 1) how much cost savings if any may materialize from existing network contracts from the deployment of ESINetII and from new maintenance contracts; and 2) the need for planned security upgrades to the existing system that may be covered as part of the deployment of the ESINetII and the upgrade to a new system architecture.
- There are a number of areas of financial opportunity that need action by both the Program Office and PSAPs in order to cost-effectively deliver services and further bend the financial sustainability curve in its favor.
- There are a number of financial practices and policies that have been or will be implemented during the strategic planning processes. These practices and policies will demonstrate financial accountability, and will allow for better coordination with the Program Office, as well as better articulation of the division of costs with PSAPs' budget for future needs.

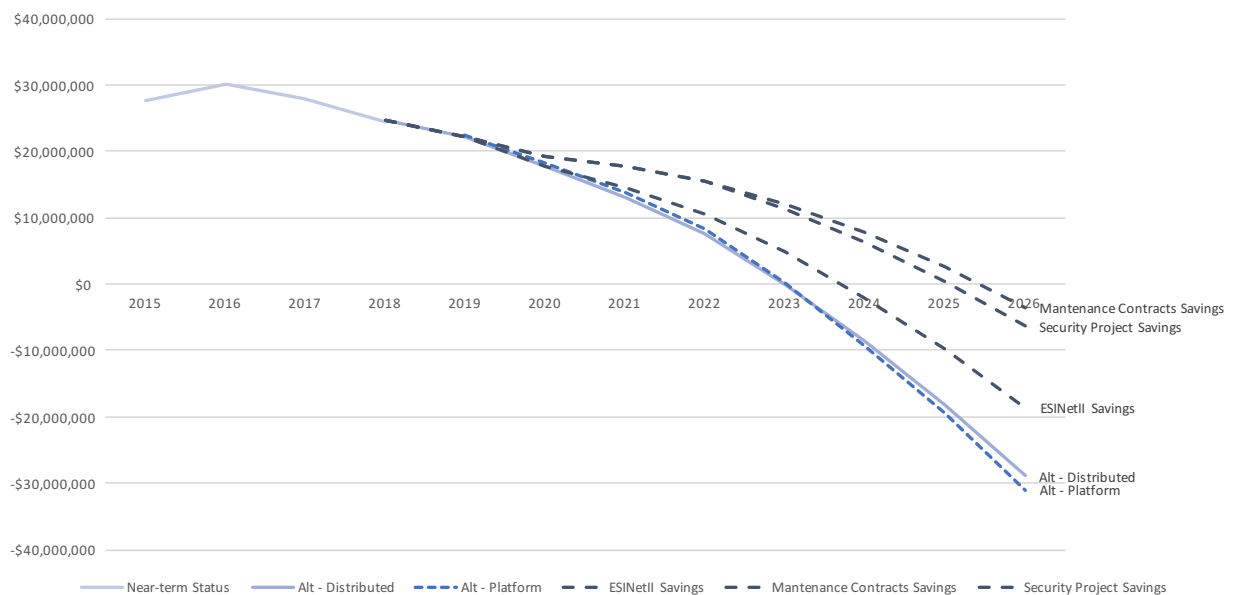
Summary of Recommendations

Based on these findings, the Task Force recommends focusing in the following areas.

Recommendation: Evaluate and capture potential savings in the following areas of financial uncertainty within the next year.

These areas of network and equipment costs represent a significant amount of annual operating expenditures. Planning and analysis of system requirements in the next 2 years must set targets for addressing possible cost-savings that might materialize in these areas. The Exhibit below summarizes the relative impact of each area.

Exhibit 3: Summary Potential Impact of Areas of Financial Uncertainty



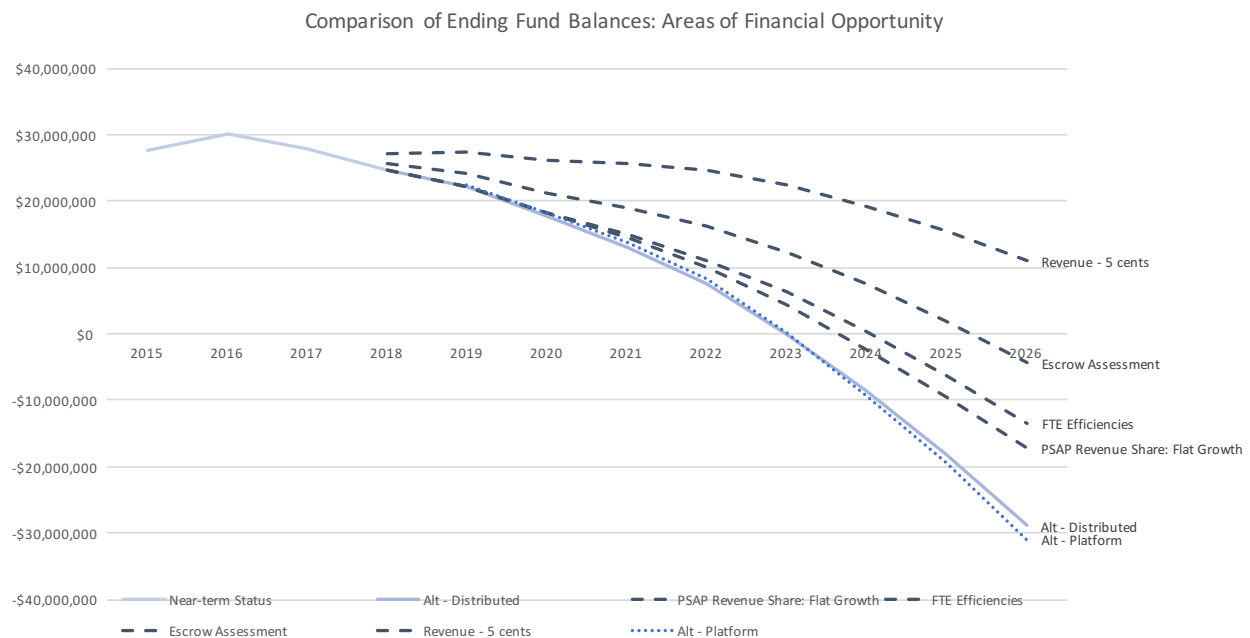
Note: Select areas of financial uncertainty show incremental changes from the Distributed architecture baseline (Platform architecture is shown for reference).

- Evaluate the potential for cost-savings following the full deployment of ESINetII. There is a current expenditure of approximately \$1.4 million which is most likely related to State trunking fees currently paid by the Program Office; it is unknown at this time whether or not the state will be required to continue payment once ESINetII has been deployed. The State caps its subsidy to King County and at this time, the Program Office is working to evaluate any potential savings.
- Evaluate potential cost-savings from new maintenance contracts associated with the deployment of a new system architecture. The Program Office currently spends about \$1.18M for hardware and software maintenance costs. In the short-term, they will have to stand up both systems but in the long-run, there may be some cost savings.
- Evaluate the potential for cost-savings from potentially redundant security improvements. The Program Office is working on a plan to evaluate the security needs of a new system architecture.

Recommendation: Take action of the following areas of financial opportunity within the next year.

These are critical to consider if there are indeed savings to be recognized, such as opportunities for further cost-saving, one-time sources of capital funding, and options for tax reform. The Exhibit below summarizes the relative impact of each area.

Exhibit 4: Summary Potential Impact of Areas of Financial Opportunity



Note: Select areas of financial uncertainty show incremental changes from the Distributed architecture baseline (Platform is shown for reference).

- Explore what amount PSAP escrow fund balances can be used to fund one-time capital needs. There are significant annual balances in PSAP escrow accounts that have been rolled over year-over-year that we recommend be assessed as part of a one-time capital funding for system upgrades. Over the past three years, end-of-year escrow balances averaged approximately \$9.9 million. Additional work needs to be completed to better understand why individual PSAPs have carried balances and to assess how changes to

escrow fund policies impact PSAP cash-flow issues. From this understanding, both the Program Office and PSAPs can evaluate how much fund balance might be available and whether a one-time assessment process could raise needed funds. This should start as soon as possible and be completed by the end of 2018. As an alternative, if an individual PSAP prefers not to use their escrow balances, they can contribute a like amount of capital funding from other sources in their PSAP budget.

- Program Office and PSAPs must work immediately on finding an affordable, fair, and appropriate level of PSAP funding that accounts for the delivery of E911 services but also places the Program Office on the path toward fiscal sustainability. If so, changes can be made and phased as needed. Decide on a fair, appropriate, and affordable PSAP funding level that accounts for the delivery of E911 services. PSAP expenditures remain at roughly 44% of Program Office expenditures, and will consume a greater and greater share of overall excise tax revenue, rising from 48% in 2015 to a forecasted level of 67% by 2026. As such, this level of revenue sharing is unsustainable given other competing needs. The Task Force has not arrived on an amount in this report but fixing the amount at current nominal levels to create some costs-savings – approximately \$11 million over 10 years. A reduction in the current level of PSAP funding would represent some fiscal challenges for PSAPs given their reliance on membership fees to support their services. Nevertheless, the Governing entity must determine the context of critical and necessary system upgrades.
- Create a cost-efficient and operationally sound staffing model for deploying and maintaining E911 equipment and software. Deployment and maintenance of the new platform system could require 3-5 additional FTEs on an operational basis. There are currently 11 FTEs and 1 dedicated Project Manager—3 of whom provide technical services for the Program Office’s regional system. There are an additional 23 excise tax-supported FTEs in the PSAPs, for a total of 35 FTE across the system. If some of the FTEs that are now in the PSAPs could be redeployed to help with the new system architecture and thus maintain the current FTE load, it could save approximately \$3.7 million over the 10 years.
- Deliver options to the King County Council to find a more adequate, yet resilient, tax base to support the nature of this safety system. Working with statewide partners to reform the E911 tax base and/or tax policy could put in place a revenue mechanism that better matches the costs of the program services. The Task Force urges that all option should be including changes to levying amounts of the current excise tax, levying a consumption tax on telecommunications, putting to vote use of the public safety sales tax measure, or other property tax based mechanisms.

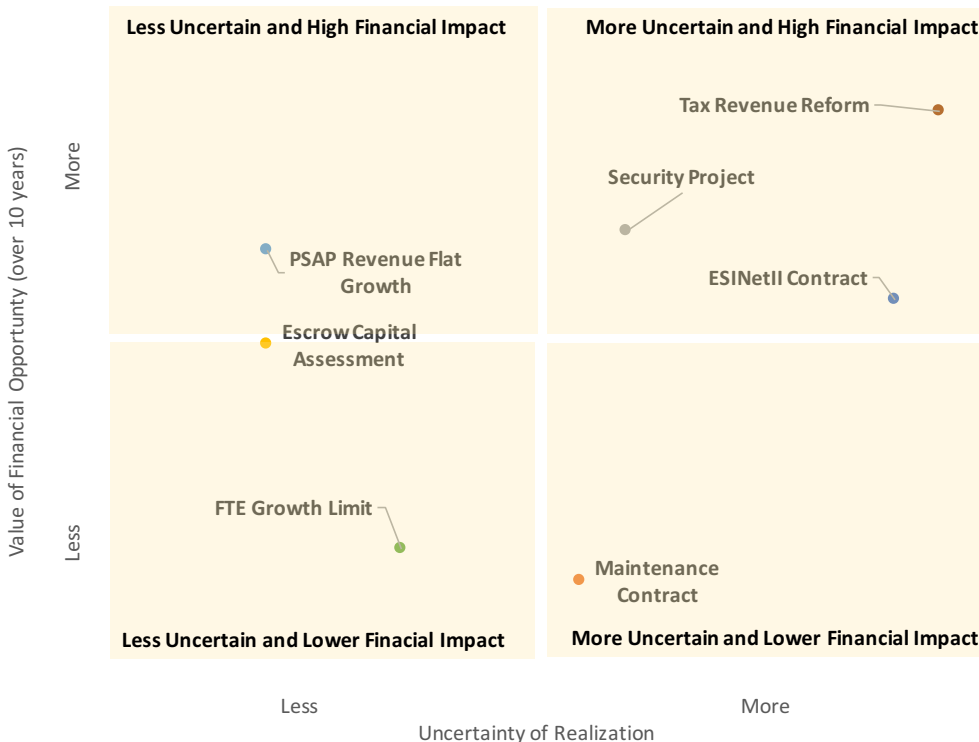
Recommendation: Immediate Action is Needed

Taken together, these areas of financial uncertainty and opportunity create a work program for the Program Office and Governing entity to tackle in the coming months and years. As the IAG efforts conclude at the end of 2017, the Finance Task Force believes the Program Office should continue its collaborative efforts with PSAPs through the Program Office and Governing entity should implement costs saving actions by the end of 2018 and recommend revenue action to the KC Council during the same time period.

The areas of financial uncertainty should become clearer as ESINetII is deployed and the selected system architecture is implemented. As shown above, a likely “best-case” resolution of these

potential cost-savings will be inadequate for system sustainability. **Therefore, expedient action is needed to recommend and implement an alternative funding structure for long-term fiscal sustainability.** While the Task Force has evaluated a number of areas that could positively impact the Program Office’s financial position, it does not foreclose other options that might be pursued in the pursuit of financial sustainability.

Exhibit 5: Summary of Financial Impact and Uncertainty of Realizing Financial Gains



Recommendation: Continue to create a set of defined financial policies and procedures.

Creating a set of defined financial policies and procedures that would lead to better budget, accounting, and accountability outcomes. During the Strategic Planning process the Program Office has worked with PSAPs through the IAG to address many of these issues and these efforts have been appreciated on all accounts. Where they have been completed, it has been noted below and are included here for a comprehensive record of changes within the Program Office. It should be noted that IAG policies and Task Force recommendations set forth a work program in these areas without expressly setting elements such as caps on reimbursements, requirements on PSAP financial planning of escrow fund balances, or combining buckets of revenue. The process has been collaborative and productive, and the Task Force hopes that the work should continue going forward. These should include:

- Creating a set of comprehensive E911 Financial Management policies.**
 These policies should be tailored to fit the uniqueness of the Program Office’s operations. As a starting point, they can be adapted from the King County Comprehensive Financial Management Policies and tailored to fit the Program Office’s needs.

- **Creating separate operating and capital budgets.** The Program Office has improved financial transparency by creating a capital budget to separate operating and capital costs in order to better plan for ongoing costs. This recommendation has been completed by the Program Office.
- **Including project management staff as part of capital projects.** Project management and subject matter labor costs should continue to be included in the cost of projects in the capital budget. These positions will likely be time-limited expenses.
- **Creating reserve accounts to fully fund future equipment replacement and capital projects.** The capital budget should be fully funded through the use of reserve (or sinking funds).
- **Creating better oversight of the implementation of capital projects.** The Program Office has taken steps to improve financial transparency by collaborating with the KCIT Program Management Office which provide Project Management, Finance, and Business Analysis personnel planning and oversight for project implementation and costs.
- **Revising PSAP Escrow Policies to ensure a clear understanding between the PO and the PSAP re: eligible expenses.** The Program Office has been collaborating with the IAG to revise escrow policies so that reimbursement eligibility is clear; review and payment process is streamlined and efficient; policies that are comprehensive and provide clear guidance on expectations; and requirements for both the Program Office and PSAPs. The Program Office and the IAG are continuing this work and will developing a work plan for implementation during Q3-4 2017. Reimbursements are typically made within 30-60 days and going forward in 2018 escrow reimbursements will be made quarterly
- **Working with PSAPs to develop a comprehensive escrow program and policies that govern reimbursements and increase accountability.** Additional work is needed to develop PSAP-level expense programs that result in more predictable spending where expenses can be prioritized and show accountability towards supporting the E911 regional system. The Task Force, at a minimum, recommends specific policies for:
 - Maximum salary reimbursement levels for FTEs. Cap the amount of salary and benefits eligible for reimbursement for supported positions at the PSAPs based upon the body of work required to support the regional system. There is a wide variation of program reimbursable FTE costs. The Exhibit below summarizes FTE costs for GIS and IT PSAP positions supported by the E911 excise tax.
 - Escrow fund balances. Some escrow funds have carried large fund balances. Creating policies for the amount and nature of the fund balances will help PSAPs in their own financial planning. The IAG is currently discussing this issue.
 - Combining the equipment and general revenue distinction into one category. The deployment of ESINetII and system architecture may change the equipment needs of PSAPs that should be reflected in the escrow policy.
- **Working with PSAPs to determine an agreed-upon basis for allocating tax revenue.** The Program Office has been collaborating with the IAG to create a more transparent escrow funding formula in order to allow for collaborative discussion with the PSAPs on potential revisions to the formula. This work is underway (as of September 2017); the IAG voted to use *a 2-year average of PSAP call volume* as the measure for

escrow fund distribution. This recommendation is currently being reviewed by the PO with the intention of implementing this change in 2019. To the extent PSAPs have significant 'losses' due to the new formula the PO will offset such reductions for the first year of implementation (2019) in order to allow the respective PSAPs time to cover these costs from other sources.

- **Engaging the state in tax revenue audits.** The Program Office should work with the State Department of Revenue to audit the compliance rate of phone line reporting.
- **Creating comprehensive and transparent annual financial reporting documentation and performance metrics.** These metrics can be folded into a high-level dashboard presentation of key financial indicators for decision-makers.

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Introduction

The Finance Task Force presents a set of considerations and recommendations for discussion to both the Planning and Leadership Groups for the King County E911 Strategic Plan. The Finance Task Force is charged with the research, deliberation, and recommendation of a 10-year Sustainable Financial Plan for the Regional E911 System. The E911 Strategic Plan Scoping Process required that the Task Force address the following set of questions during the strategic planning process. The Regional E911 Scoping Committee identified a number of strategic questions, including:

- What are the procedures and processes for forecasting, reporting, auditing, and operations related to King County Regional E911 System revenue and expenditures?
- What are the funding needs and revenue strategies for the King County Regional E911 System, including NG911 upgrades and keeping the system up to date over time?
- What are the stakeholder reporting requirements related to the King County Regional E911 System finances, including revenue, expenditures, efficiency, and effectiveness?
- What are the investment management policies for the King County Regional E911 System related to forecasting, investments, reserves, and contingencies?

The Task Force believes the work covered over the past year has substantively addressed many of these questions and that the recommendations contained within this report respond to the central financial and accountability issues raised during the scoping process.

The Task Force consists of 12 individuals nominated by the Planning Group. The members and their representation are listed below:

- Marilynne Beard, Co-Chair, Sound Cities
- Tom Koney, Co-Chair, King County E-911 Program Office
- Tatyana Bogush-Stakhov, Large PSAPs
- Krystal Hackmeister, City of Bellevue
- Jason King, King County Sheriff's Office
- Tim Osgood, Fire Departments
- Tom Goff, King County Council
- Jennifer Devore, City of Seattle Council
- Kate Davis, King County Executive Office
- Tom Walsh, City of Seattle PSAP
- Tara Murker, Small PSAPs

The Task Force met eleven times since August 2016. The members engaged in a work program designed to gain a shared understanding of the current financial management issues within the Program Office, identify key issues and problems, suggest potential remedies, and put forward potential recommendations for the future funding of the E911 Financial Plan. Over that period, the

group has reviewed relevant financial documentation, completed original research, and held discussions covering:

- The existing financial conditions and policies within the E911 Program Office
- Research into other E911 program practices within the state of Washington and across the country
- Program fund balances, operation budgets, capital projects, and PSAP escrow accounts.
- Research on how PSAPs use E911 transferred funds
- Financial modeling examining the impact of alternative expenditures and revenue arrangements

Further, the Task Force worked with the Technology and Operations Task Force on understanding current operational requirements, options for future system architectures, and cost-estimating. We understand these costs to be of strong quality given the planning level circumstances that they are derived from; however, some variance is to be expected going forward once better planning and analysis is completed and fuller accounting of costs can be produced.

1 Guiding Principles and Sustainability Objectives

In consideration of the Strategic Finance Questions above, the Finance Task Force developed a set of guiding principles to support its inquiry and research. These guiding principles will ultimately support a 10-year Sustainable financial plan that:

- Is clear, understandable, and transparent.
- Supports agreed-to system responsibilities of stakeholders that will include the E911 Office, King County, the PSAP's and their sponsoring agencies.
- Includes a mechanism to provide accountability for all expenditures articulated through financial management policies, timely reporting, and audits.
- Incorporates a measure of flexibility to accommodate evolving system needs and changes in resources.

The following three principles come from the E911 Strategic Plan scoping document and represent guidance set forth for this effort from the plan's sponsors.

- Fiscal Responsibility – equitable, transparent, and responsible fiscal management
- Financial Sustainability – manage toward long-term financial sustainability
- Cost Effective – leverage resources to provide the best possible services

The Finance Task force accepts the key principles from scoping and has further refined them based on their discussions. The following summary the Finance Task Force Principles includes a working definition of the principle and list of key objectives for each principle.

Principle #1: The Fiscal Responsibility Principle

The system must rely on clearly articulated financial management policies that reflect responsible stewardship of E911 resources, and ensure that they are used for their intended purposes. We

must be open and transparent about all the E911 finances, making financial information available to all stakeholders, and build trust and collaboration among partners.

Representative Objectives:

- Employ budget, financial, and accounting policies and procedures that are coordinated, coherent, and consistent across all levels of the system, primarily King County and the PSAPs.
- Achieve fair and consistent allocation of resources to the entire system (e.g. King County and PSAPs) that support E911 system functionality.
- Provide clear, accurate, and timely financial reports to inform the key stages of policy formulation, budgeting, implementation, and review.
- Provide objective performance information to show that the system's efforts are becoming more efficient, effective, and accountable.

Principle #2: Fiscal Sustainability Principle

The Fiscal Sustainability Principle – The E911 system should make effective and efficient use of resources, achieve E911 objectives, fulfill commitments to stakeholders, and prepare for long-term fiscal sustainability. Financial sustainability of E911 revenues is important to the services delivered by both the King County Program Office and PSAPs.

Representative Objectives:

- Employ budget approaches that lead to structurally sound fiscal decisions that support the capital and operational needs/objectives of the E911 system. This includes addressing both expenditure and revenue needs.
- Maintain distinct capital and operating budgets.
- Prioritize funding on investment and operation in the regional system before other eligible E911 expenses that expand services.
- Assure that appropriate budget measures are in place to fund expected investments and unexpected events, including sufficient reserves for equipment replacement, operating expenditures, and capital investment.

Principle #3: The Cost-Effective Principle

The Cost-Effective Principle – We should invest and spend available resources in building and operating a more efficient E911 system. Investments in the E911 system need to be effective and reinforce broader program goals.

Representative Objectives:

- Identify basic levels of service for defined deliverables to achieve predictable staffing levels at King County and PSAPs.
- Define and advocate for favorable terms for procured third-party contracts for network and technology services.

King County Regional E-911 Strategic Plan

- Assure that budget and expenditure planning reflect understanding of total cost of ownership across the system.
- Assure consistent and efficient use of E911 resources throughout the regional system including funds allocated to the PSAPs.

Summary of Key Findings

The Finance Task makes the following findings to support its recommendations to the Planning and Leadership Groups. These findings are covered in the section below.

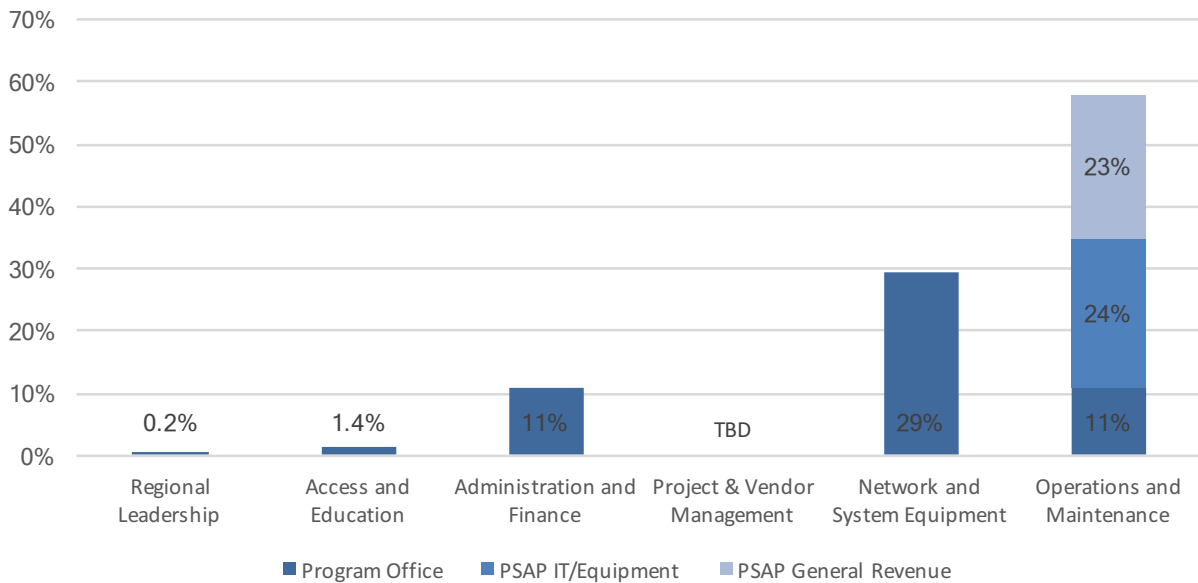
E911 service relies on activities delivered by both the Program Office and PSAPs.

The regional E911 System has six core activities described below.

- **Regional Leadership:** These activities include work with local, state, and national associations and committees; and legislative efforts regarding new technology and other professional issues.
- **Program Oversight and Administration:** This includes activities associated with program, vendor and asset management; development of policies and procedures; and staffing related to data analysis, communications, budget, finance, and strategic planning.
- **System Access and Education:** This includes work that expands system access and appropriate uses, such as social marketing strategies, education campaigns, events, training and materials, and language interpretation services.
- **Project and Vendor Management:** These activities include work related to project planning, budget and management, vendor delivery oversight, and compliance.
- **Network System and Equipment:** These activities support call delivery from the State 911 network to PSAPs, E-911 phone maps, location data, GIS data, local network, security, and trunking.
- **Operations and Maintenance:** This includes hardware for network, security, and telephone equipment; asset tracking; software licensing, updates, upgrades, fixes, and vendor and PSAP coordination; PSAP subsidies for technical staff; and PSAP operations and equipment.

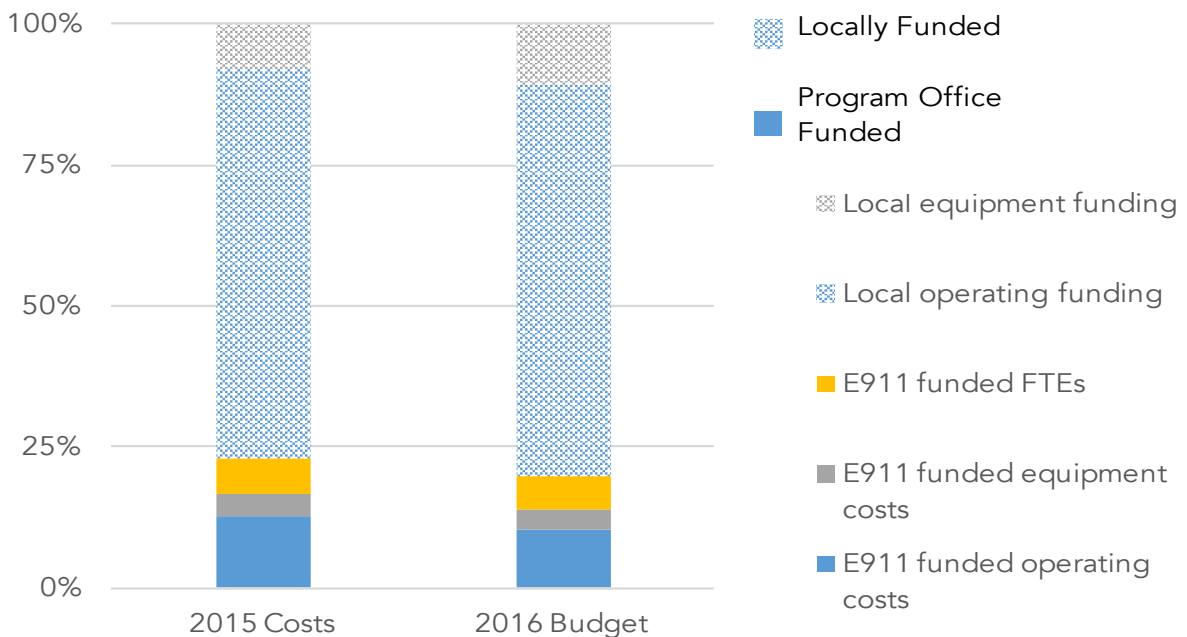
The Exhibit below shows that the E911 excise tax supports E911 related services and technology delivered by both the King County E911 Program Office and PSAPs. Nearly 90% of program expenditures are in the Network System and Equipment and Operations and Maintenance categories. Within those activities, nearly 47% of the E911 expenditures are delivered by the PSAPs via transfers to their escrow accounts for eligible reimbursements of IT/GIS employees, equipment, and other activities (primarily those related to call taking). As of this time, no break out for expenses related to Project and Vendor Management activities is available.

Exhibit 6: E911 expenditures as percent of program activities (2016)



Further, E911 excise revenues are an important source of funding for PSAPs operations and it is the only source of funding for the E911 PO. Region-wide, the revenues distributed by the Program Office account for approximately 20% of the overall funding for PSAP expenditures as shown in the Exhibit below. These distributed revenues support the operation and maintenance of the regional E911 system.

Exhibit 7: Comparison of Local and Program Funded Activities at PSAPs



The Distributed architecture is the lower cost alternative.

The Distributed architecture costs less than the Platform alternative. Over the 10-year period ending in 2026 (assumes new platform in 2020), the Distributed architecture is estimated to cost approximately \$2 million less than the Platform. On a total cost of ownership perspective (10 years of ownership from 2020-2030), the Distributed architecture is estimated to cost approximately \$5 million less as shown in the Exhibit below.

Exhibit 8: Comparison of System Architecture Costs

	Alt 1 – Distributed Architecture	Alt 1 – Platform Architecture
One-Time System Implementation Costs (CAPEX)	\$8,181,217	\$7,337,930
Annual System Maintenance Costs (OPEX) - first year	\$385,846	\$348,899
10-year OPEX (incl. refresh x 2)	\$5,829,008	\$5,246,374
Annual Networking Costs	\$0	\$700,000
10-year Networking Costs	\$0	\$7,000,000
Total: 10-year Cost of Ownership	\$14,010,225	\$19,584,304

Note: CAPEX and OPEX system costs based on median of cost estimates received. Networking costs are a placeholder for the two networks for Single Platform.

From a capital expenditure (CAPEX) perspective, the Platform architecture could be approximately 7% to 10% less costly than the Distributed architecture. This could result in a CAPEX savings of between \$545,000 and \$843,000 (range between low and high estimates). From an operating expenditure (OPEX) perspective, the Platform architecture could be approximately 10% to 12% less costly than the Distributed architecture. This could result in a 10-year OPEX savings of between \$583,000 and \$712,000. Annual savings would be relatively small, with the median cost estimate difference for the first year of maintenance being only approximately \$37,000.

However, networking costs for a Platform system is estimated to be significantly higher. The Platform architecture would cost an additional \$7,000,000 over 10 years (assumes additional network costs of approximately \$700,000 a year). The combination of these three costs leads to a lower total cost of ownership of the Distributed architecture.

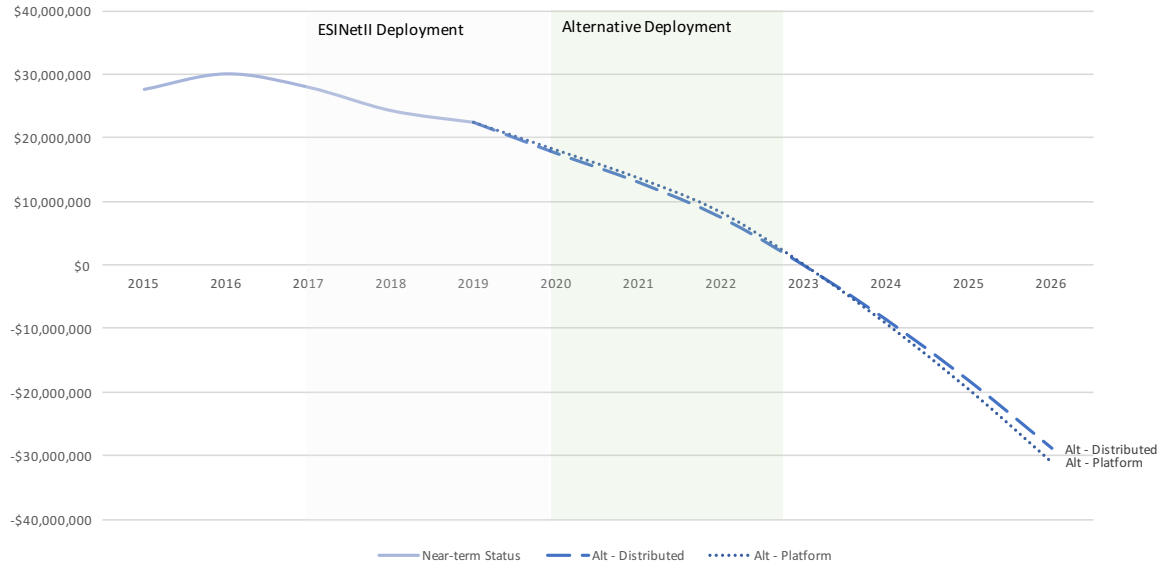
A new system architecture will materially improve the Program's future fiscal position, however there are relative small differences between alternatives.

Projected levels of expenditures are forecasted to outpace revenues and lead to negative fund balances in the near future – currently estimated to be in 2023. It should be noted that this forecast is a significant improvement of past forecasts showing negative fund balances in the next budget biennium. These improvements represent work completed by King County, the Program Office, PSAPs, and the Finance Task Force to bring other perspectives to the Program Office's financial planning.

A new system architecture improves future financial position by potentially lowering current levels of spending. However, neither system architecture choice presents a material difference in the overall financial position of the E911 Program Office. Based on preliminary cost estimates, the

Distributed architecture costs marginally less on a total cost of ownership basis; however, the difference is relatively small as percent of total program expenditures – approximately 6% in 2026. However, the Platform architecture is likely to have operational efficiencies in the form of fewer needed FTEs not captured in these estimates that may lower its costs.

Exhibit 9: Comparison of Beginning Fund Balances Between System Architectures



By 2026, the ending fund balance is forecast to be in deficit of \$28.9 million for the Distributed architecture and \$31.0 million for the Platform architecture (it should be noted that the difference in from the figures above represent only six years of architecture deployment within the 2016-2026 planning window).

This analysis assumes the following key parameters:

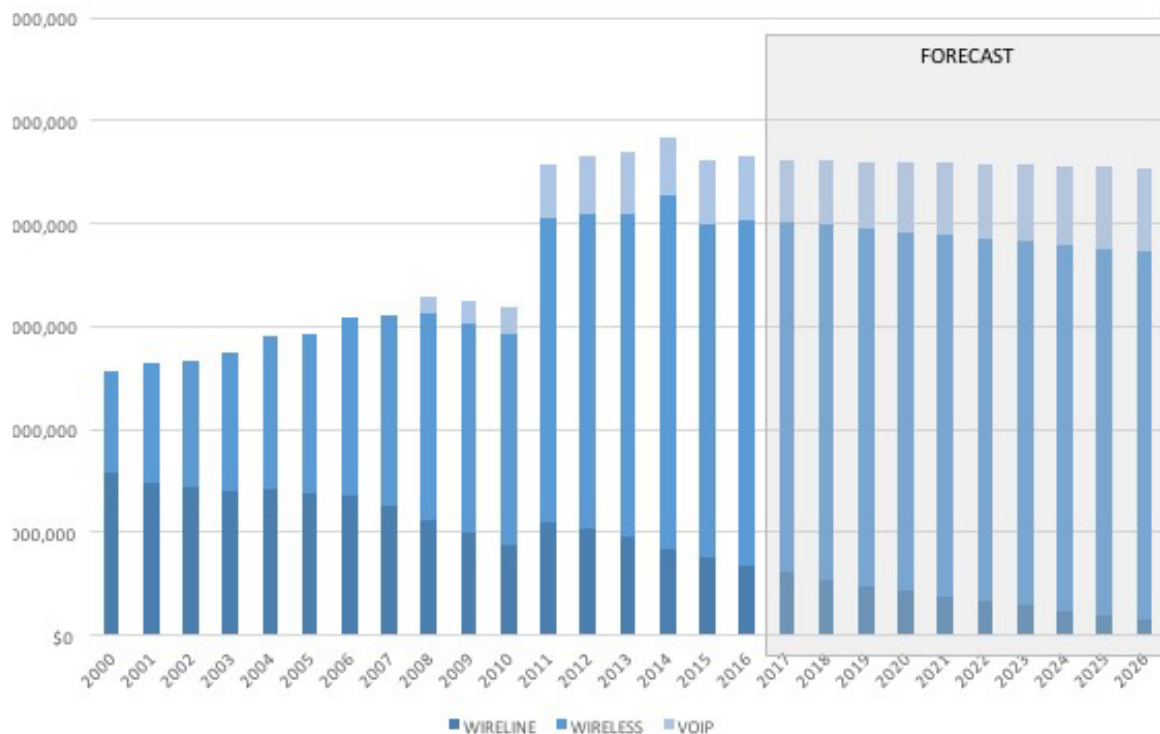
- There is no “status quo” or “no action” option. The deployment of ESINetII will not bring King County and PSAPs up to national standards under current equipment and software. An upgrade will be necessary to bring the county up to national standards following the deployment.
- The Program Office will continue to deliver planned projects and work under existing contracts through the near-term defined as through at least 2019/2020. During this time, the ESINetII would reach full deployment.
- Over the next 2 years, the Program Office is planning on assessing its needs and specifying the configuration of the selected system architecture. Project deployment would occur during the 2020 to 2022 time-frame.
- Current levels of PSAP and Program Office FTE staffing are assumed to continue over the planning period with the following departures.
 - Project management (and subject matter experts) are treated as time-limited staff. Their need is estimated as a load on the capital project for its duration. Therefore, these costs are included as part of the capital budget.

- An additional 3 FTE are included in the Program Office staffing beginning in 2022 in order to manage and maintain the system. This figure represents guidance received from vendors as part of the cost estimating work done by the T&O Task Force. These are FTEs related to servicing the system architecture above and beyond the capital programming. Those FTE's are currently assumed to be in the Program Office, however, that is not a required destination for those employees. Those FTEs could also be retrained PSAP IT FTEs so that the total load is not increased.
- Total amount of allocations to PSAPs grow at the rate of inflation.
- CAPEX and OPEX costs are modeled per T&O Task Force input at the median cost estimate.
- No historical NG911-related expenses are included past 2017, these expenditures are assumed to be covered by the deployment of the new system architecture.
- The current contract expense related to the SHNS ring is expected to end after ESINetII deployment in 2020.

Excise tax revenues have not kept pace with inflation – outpacing forecasted expenditures.

Revenue is forecasted to be relatively flat through 2026. Revenue has not increased since the excise tax increase in 2011, however, little growth in the base number of phone lines was evident even before that time. While growth is expected in VOIP and wireless lines during the forecast period, these increases will not overcome the rate at which households are abandoning their wired lines.

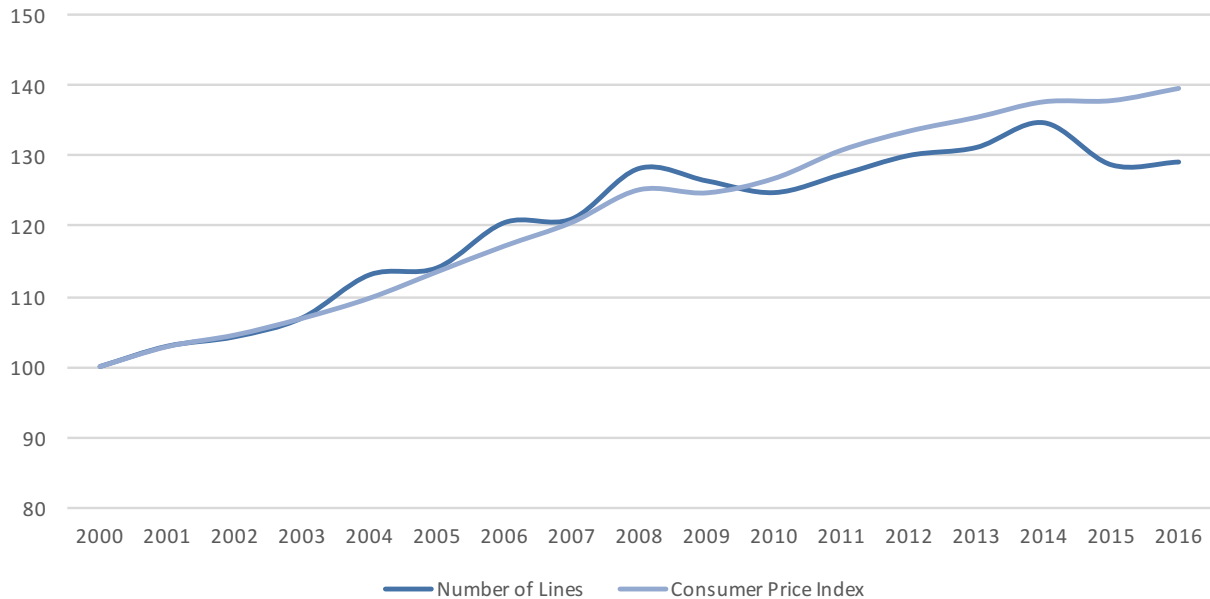
Exhibit 10: Historical and Forecasted E911 Excise Tax Revenue



Note: A \$0.20 excise tax rate increase was authorized by the State of Washington in 2011.

The tax base and tax policy that supports program revenues have not kept pace with inflation, much less the cost of labor and technology. The Exhibit below shows the change in the number of lines relative to the Consumer Price Index (US, all urban consumers). The chart is indexed to the year 2000. By 2016, the difference between CPI and the growth in phone lines is approximately 10%.

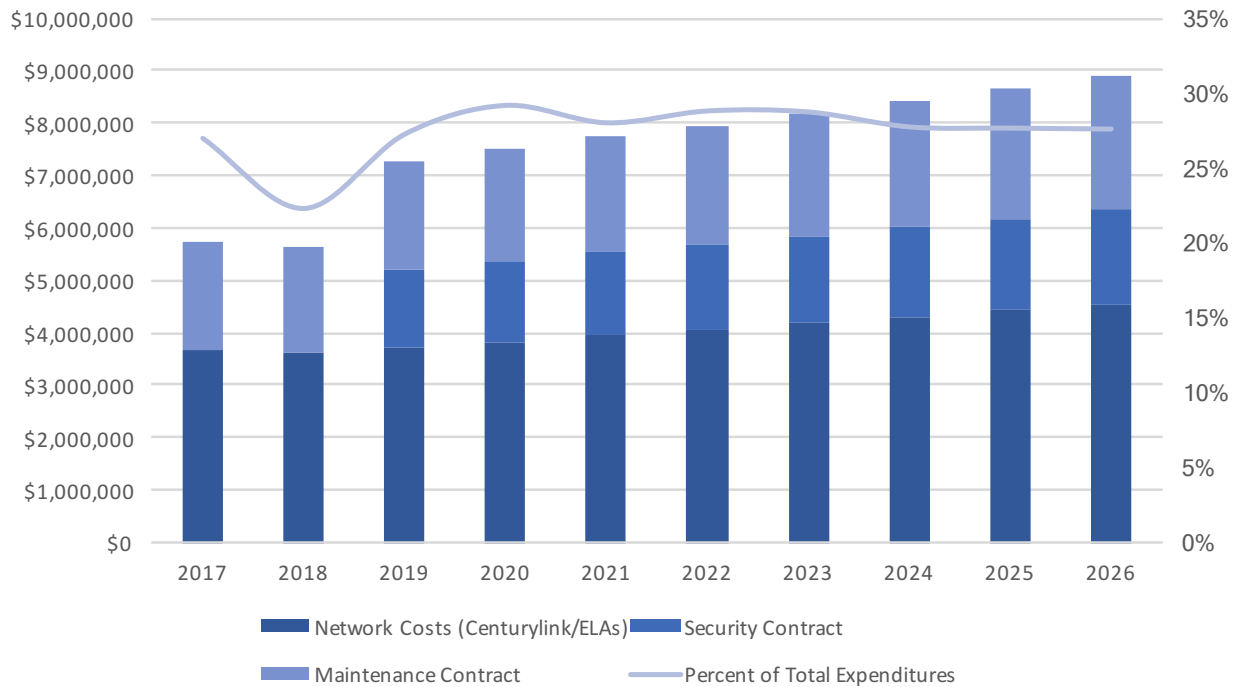
Exhibit 11: Change in Number of Phone Lines Relative to Inflation (Index 100 to year 2000)



The need and level of certain future expenditures will need to be evaluated.

As the Program Office plans for a new technology system, they will need to evaluate how much cost savings may materialize from the deployment of ESINetII, new maintenance contracts, and the security of the new system architecture. The Exhibit below shows three categories for expenditures that may be impacted by ESINetII and system architecture deployments. They include current network costs, planned security improvement projects, and maintenance contracts for equipment and software. These estimated future costs represent approximately 25-27% of all operating expenditures in either system architecture alternative (higher in the Platform architecture).

Exhibit 12: Current and Forecasted Expenditures for Select Contracts



Additional financial matters will need to be evaluated in order to further improve the financial position of the Program Office.

There are a number of areas of financial opportunity that need to be explored by the Program Office and PSAPs in order to cost-effectively deliver services. These areas include:

- Finding the most cost-efficient number of FTEs necessary to deploy and maintain the regional system.
- Funding approaches for the one-time nature of capital upgrades.
- Controlling expenditures of PSAP-delivered operation and maintenance services.
- Controlling growth in labor costs necessary to deploy and maintain the regional system.
- Exploring other revenue options.

Budget and accounting practices can be improved for better accuracy and accountability.

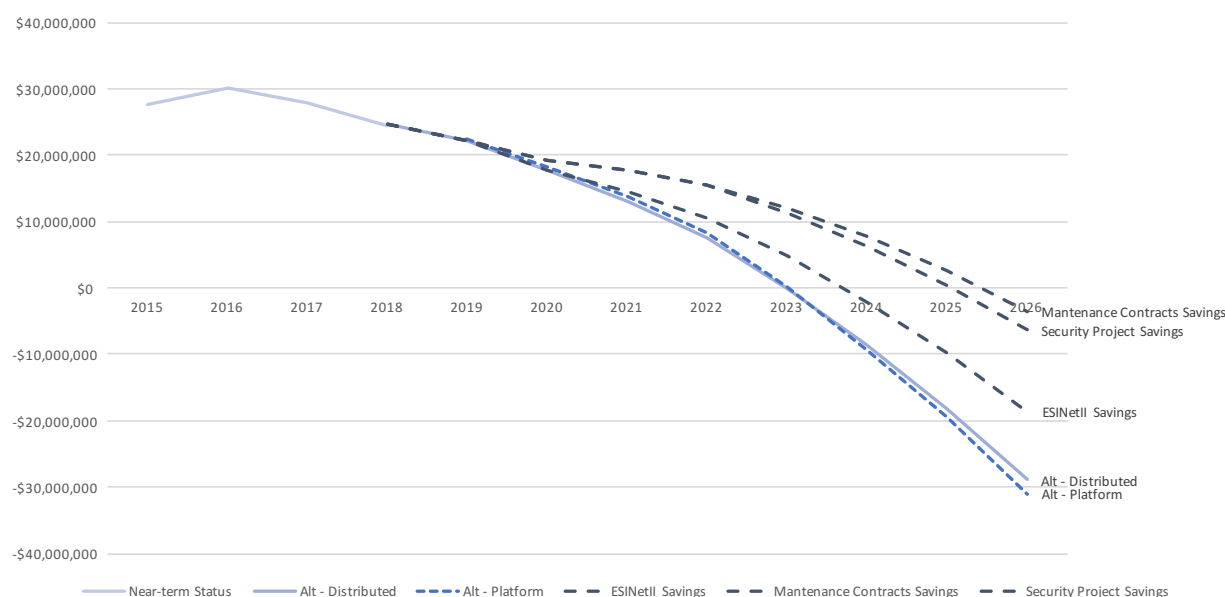
Finally, the Task Force believes there are a number of financial practices and policies that need to be implemented by the Program Office to better coordinate with PSAPs, budget for future needs, and show financial accountability including policies for operating budgets, capital asset management, expenditures, revenues, fund balances and reserves. Past practices regarding budgeting and other accountability measures are improving and continued focus in these areas will help the Program Office more effectively deal with its financial challenges.

E911 Financial Sustainability Plan

Recommendation: Evaluate and capture potential savings in the following areas of financial uncertainty within the next year

These areas of network and equipment costs represent a significant amount of annual operating expenditures. Planning and analysis of system needs will shed light on how much cost-savings might materialize in these regarding network, maintenance, and security contracts. The Exhibit below summarizes the relative impact of each area discussed. Preliminary assessment of these areas is shown as a “best case” potential.

Exhibit 13: Summary Potential Impact of Areas of Financial Uncertainty – Beginning Fund Balances



Note: Select areas of financial uncertainty show incremental changes from the Distributed architecture baseline.

Evaluate the extent of cost-savings derived from the full deployment of ESINetII.

ESINetII represents a major improvement in network services for the Program Office and PSAPs. Current CenturyLink and ELAs (enterprise licensing agreements) expenditures are approximately \$3.6 million a year. At this point in the ESINetII deployment, it is not clear whether trunking and/or costs that exceed the state threshold of subsidy of ESINetII would materially change the cost to the Program Office for network costs. Based on preliminary assessment, there are network contracts totaling approximately \$1.4 million a year that will need to be evaluated for possible ESINetII impacts.

Evaluate the extent of cost-savings from new maintenance contracts associated with the deployment of a new equipment.

Maintenance contracts for equipment and software were estimated by vendors in the T&O Task Force cost-estimating process. Those costs, in the \$400,000 a year range, are significantly lower than current contracts for maintenance (currently about \$1,000,000 a year). However, it is

unclear whether this represents a true “apples-to-apples” comparison. A deeper evaluation of the current maintenance contracts will need to be performed to determine potential savings. As a new system architecture is deployed, it is possible that the nature of the maintenance contract will shift from an equipment basis to a software basis. If this is the case, then perhaps some of the cost-estimate price savings may materialize; however, that will not be known until more planning and analysis is completed in the years to come.

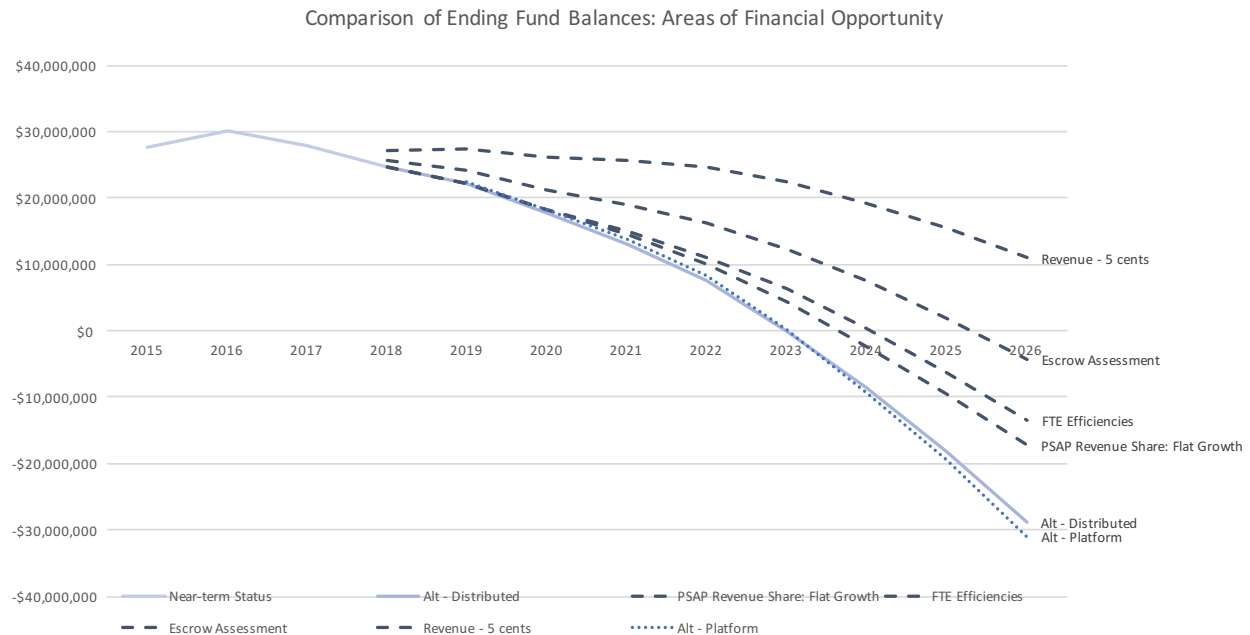
Evaluate the extent of cost-savings from potentially redundant security improvements.

The Program Office completed a study recommending a series of security projects that would be needed in order to preserve network security integrity. However, the dual deployment of ESINetII and an upgraded system architecture would mean that those security upgrades will need to be re-evaluated and could constitute a place for cost-savings.

Recommendation: Take action of the following areas of financial opportunity within the next year.

These areas are places for further cost-saving, options for one-time capital sources of funding, or options for tax reforms. The Exhibit below summarizes the relative impact of each area.

Exhibit 14: Summary Potential Impact of Areas of Financial Opportunity



Note: Select areas of financial uncertainty show incremental changes from the Distributed architecture baseline.

Explore what amount of PSAP escrow fund balances can be used to fund one-time capital needs.

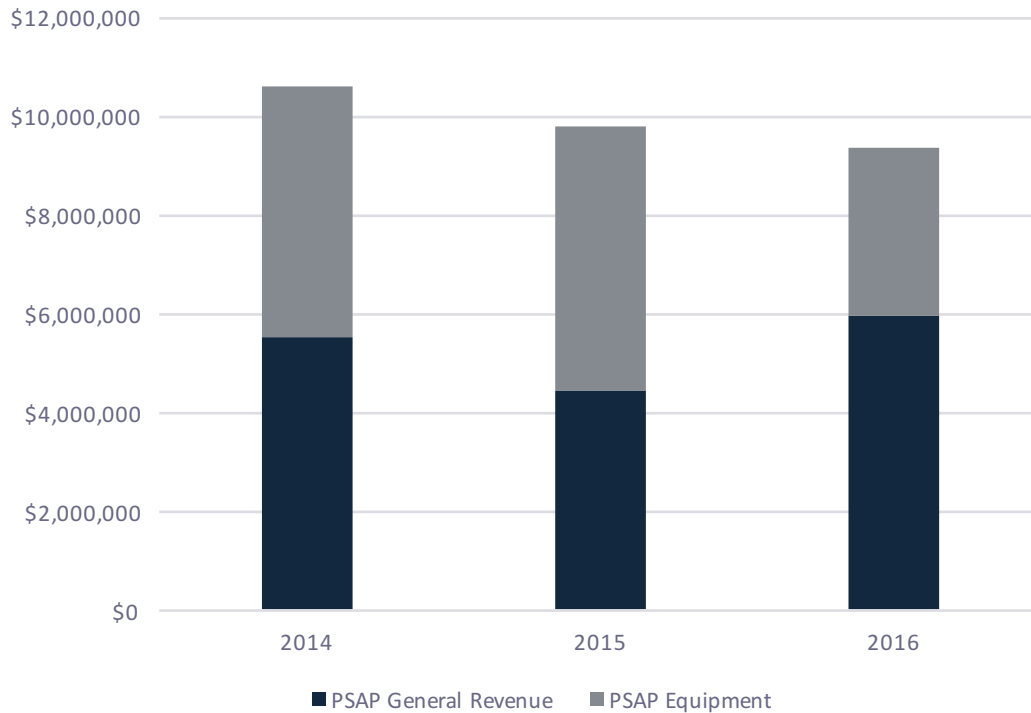
Finding one-time money for capital projects is difficult given limited dedicated sources of funding. Additionally, the approach used to fund (or finance) one-time upgrades may also need to take a different approach than funding operations. There are significant annual balances in PSAP escrow accounts that have been rolled over year-over-year. Over the past three years, end-of-year escrow balances averaged approximately \$9.9 million; the Exhibit below shows end-of-year escrow balances from 2014 to 2016. While the figures are reported on collectively, there are significant variations from PSAP to PSAP regarding fund balances.

Both the Program Office and IAG are working on a set of reforms to the PSAP escrow policies to help streamline reimbursements and to clarify eligible expenses to ensure consistency across the system. For this reason, some PSAPs have carried balances to cover timeliness issues regarding reimbursements since balances fluctuate throughout the year. Further, some PSAPs have carried balances for other legitimate purposes, such as saving for equipment purchases, cash flow management, pending reimbursement requests, and smoothing of increases to PSAP member agencies (rate stabilization).

The Task Force believes the additional work needs to be completed to better understand why individual PSAPs have carried balances and to assess how changes to escrow fund policies (see a

later recommendation on this issue) impact PSAP cash-flow issues. From this understanding, both the Program Office and PSAPs can evaluate how much fund balance might be available and whether a one-time assessment process could raise needed funds. Any assessment would need to find a fair and equitable way to levy an assessment through the strategic plan's governance structure.

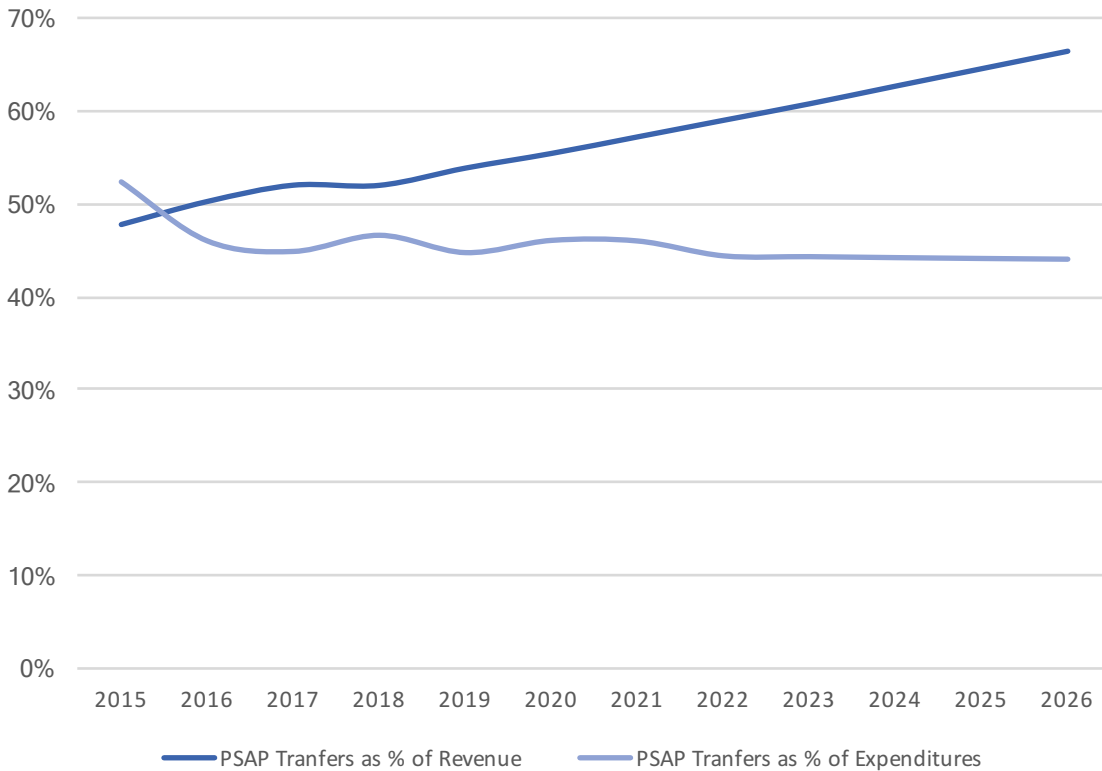
Exhibit 15: Ending Fund Balances for PSAP Escrow Accounts



Decide on a fair and appropriate PSAP funding level that accounts for the delivery of E911 services and helps place the Program Office on a more financially sustainable future.

PSAP transfers account for approximately 50% of annual excise tax revenue. Historically, these transfers have grown, trending up with over successive budgets. The Exhibit below shows historical and forecasted PSAP transfers as a percent of total revenues and as a percent of total expenditures. While PSAP expenditures are forecasted to remain at roughly 44% of expenditures, they consume a greater and greater share of overall excise tax revenue—the PO's only source of revenue—rising from 48% in 2015 to a forecasted level of 67% by 2026. That level of revenue sharing is unsustainable given other competing needs.

Exhibit 16: Past and Forecasted PSAP Revenue Transfers as Percent of Program Revenue and Expenditures



The rate of excise tax transfers has no recorded policy precedent and reflects past budget practices. For example, fixing the amount at current nominal levels will create some costs-savings – approximately \$11 million over 10 years.

However, as shown earlier, E911 excise tax revenues support approximately 20% of PSAP call answering expenses. The funds cover eligible E911 expenses related to equipment, IT/GIS staffing, and other related expenses (call-taker costs are large reimbursable expense). A freeze in the level of funding is likely to represent some fiscal challenge for PSAPs given their reliance on membership fees to support their services. Their members, local and special purpose districts, have their own fiscal challenges that make funding increased costs a difficult proposition for their decision-makers and constituents.

It is also critical to note that while excise tax contributes to PSAP funding, it is the only source of funding for the Program Office. Flat revenues and growing PSAP allocations mean that the Program Office has to absorb inflationary increases and also would require them to do more work with less staff.

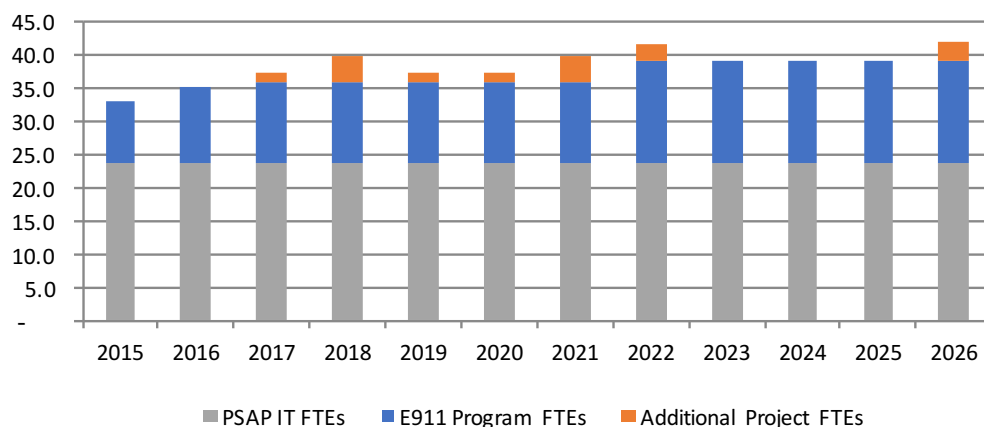
Regardless, the Program Office and PSAPs will have to work immediately on finding a fair and appropriate level of PSAP funding that accounts for the delivery of E911 services so that changes can be made and phased as needed. The suggestion of fixing the level to nominal 2017 levels is

a suggestion not shared by all members of the Task Force, but the desire to find clarity on the issue is so the burden of funding cuts can be mutually shared.

Create a cost-efficient and operationally sound staffing model for deploying and maintaining E911 equipment and software.

There are currently 11 Program FTEs and 1 dedicated Project Manager and 23 PSAP-supported FTEs paid for by the Program Office. Deployment and maintenance of the new system could require 3-5 additional FTEs according to preliminary estimates provided by the T&O. Those FTE's are currently assumed to be in the Program Office, however, that is not a required destination for those employees. Those FTEs could also be retrained PSAP IT FTEs so that the total load is not increased. The Exhibit below shows forecasted growth in FTEs funded by the E911 excise tax (same FTE counts for both the Distributed and Platform architectures).

Exhibit 17: Forecasted FTE Counts (Distributed and Platform Architectures)



Finding a way to cover the FTE costs associated with the new system under the current FTE load could save approximately \$3.5 million over the 10 years. Any changes to overall FTE needs will need a phase-in process to deal with changes at either the PSAP or Program Office level.

Explore options to find a more adequate, yet resilient, tax base/policy to support the nature of E911 activities.

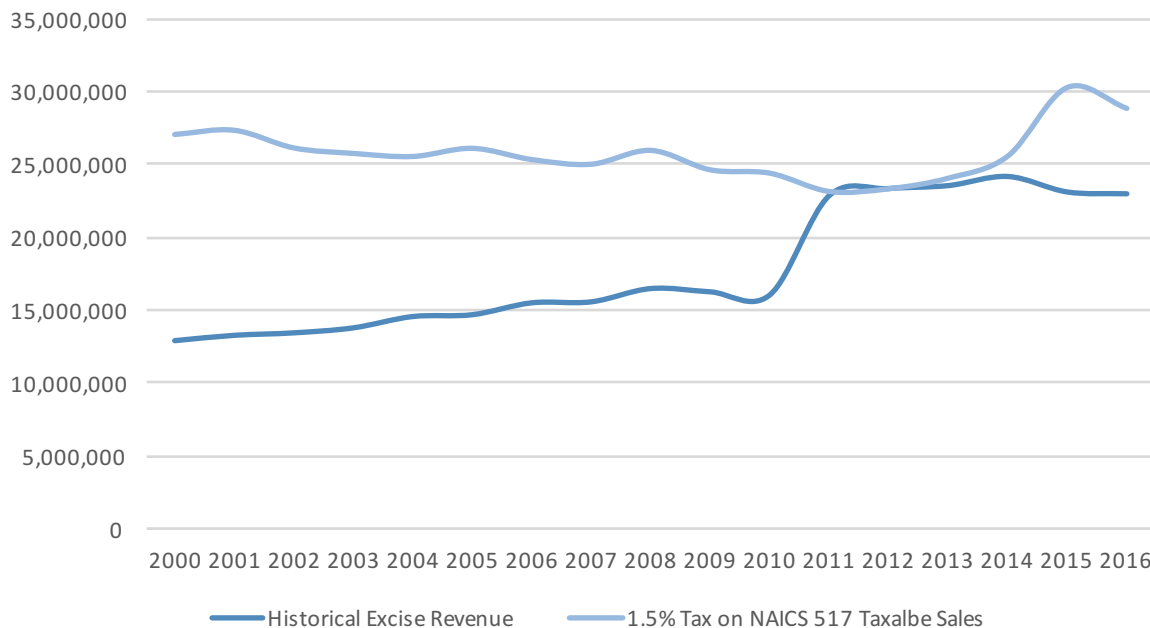
Working with PSAPs and statewide partners to reform the E911 tax base and/or tax policy could put in place a revenue mechanism that better matches the costs of the program services. As stated earlier, the loss in the number of wired lines (a key factor in the assessment of 911 taxes) has led to flat tax revenue collections. In 2010, the state legislature implemented an increase to the excise tax rate to deal with similarly flat collections. In the future, authority to levy an additional \$0.01 a year per line would generate an additional \$3 million over 10 years. Likewise, a \$0.05 increase would generate an additional \$15 million over 10 years. An approximately \$0.10 increase starting in 2018 would be needed to maintain a positive fund balance in 2026 under baseline conditions (e.g. no assumption of cost savings). However, the ability to sustain a positive fund balance would require a change to the tax structure that allows it to grow with inflation.

Alternatively, a consumption based tax could generate more revenue but might be a less predictable source. For illustrative purposes, a county-wide tax on taxable retail sales of businesses within NAICS sector 517 could produce similar revenue results. NAICS 517 is in the Telecommunications subsector which is primarily engaged in operating, and/or providing access to facilities for the transmission of voice, data, text, sound, and video. This includes business:

- Wired communications carriers
- Telecommunications carriers, cellular telephone
- Cellular telephone stores, primarily selling cellular phone service plans
- Cellular telephone services
- Cellular telephone communication carriers

The Exhibit below illustrates the impact of a hypothetical 1.5% tax on the value of the taxable retail sales in NAICS 517 in King County relative to the revenue collected from the E911 excise tax. Sales have generally declined since 2000 but have picked back up in recent years. Since the excise rate was increased in 2011, a 1.5% tax rate would have generated over \$15 million more than the excise tax.

Exhibit 18: Illustration of a hypothetical tax on Telecommunications sector taxable retail sales



The Public Safety sales tax measure could also be considered. King County currently uses the criminal justice sales tax in RCW 82.14.030 but regional partners could also examine the Public Safety sales tax measure per RCW 82.14.450. This tax must be shared between King County and incorporated cities and would require a public vote. The law allows up to a 3/10th of a percent increase and the county does have untapped capacity with this sales tax. King County put this tax on the ballot in the November 2010 general election for 2/10th of a percent and the measure failed by a margin of 55% oppose and 45% approve.

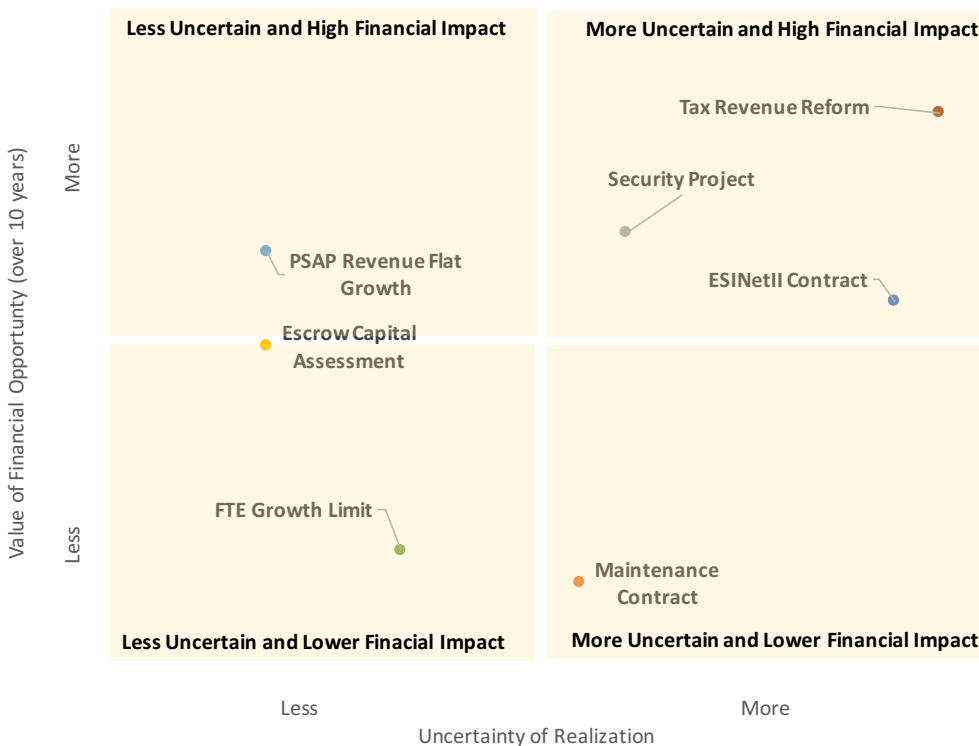
Regardless of the best option for funding the system, the Program Office and PSAPs will have to work with their legislative partners to advance the issue to state and local legislators.

Recommendation: Immediate Action Is Needed

Taken together, these areas of financial uncertainty and opportunity create a work program for both the Program Office and PSAPs to tackle in the coming months and years. As the IAG efforts conclude at the end of 2017, the Finance Task Force believes the Program Office should continue its collaborative efforts with PSAPs to improve the financial position of the Program Office through an agreed upon governance structure that is a part of this strategic planning process.

The areas of financial uncertainty should become clearer as ESINetII is deployed and the Program Office plans and assesses its needs for the selected system architecture. As shown above, a likely “best-case” resolution of these potential cost-savings will be inadequate to avoid future negative fund balances. Therefore, expedient action is needed to find additional ways to implement action to further improve the Program’s Office financial position and long-term fiscal sustainability. While the Task Force has evaluated a number of areas that could positively impact the Program Office’s financial position, it does not foreclose other options that might be pursued in the pursuit of financial sustainability.

Exhibit 19: Summary of Financial Impact and Uncertainty of Realizing Financial Gains



Recommendation: Continue to create a set of defined financial policies and procedures.

Finally, the Task Force believes there are a number of financial practices and policies that need to be implemented by the Program Office to better coordinate with PSAPs, budget for future needs, and show financial accountability.

Create a set E911 Financial Management Policies.

These policies should be tailored to fit the uniqueness of the Program Office's operations. As a starting point, they can be adapted from the King County Comprehensive Financial Management Policies. Greater consistency and standardization of practices enhances the transparency of financial management by providing a clear policy basis and explanation of why certain financial management practices are being followed along with the anticipated outcome. By institutionalizing good financial management practices, the County will continue to maintain strong bond ratings and sustainable services. These policies should include specific Program Office and include at a minimum:

- Operating budgets
- Capital asset management
- Expenditures
- Revenues
- Fund balance
- Reserves

Create separate operating and capital budgets.

The Program Office has taken the following steps to improve financial transparency by creating a capital budget to separate operating and capital costs in order to better plan ongoing operating costs. It is desired that the Program Office and PSAPs will work together and communicated during the budgeting process through the strategic plan governance structure. Distinguishing the nature of operating costs (i.e. contracts, labor, etc.) from capital costs (equipment, software, project management, etc.) is essential for understanding current, near-, and long-term financial position of the Program Office.

Create reserve accounts to fully fund future capital projects.

The capital budget should be funded through the use of reserve (or sinking funds). Payment of capital should be completed on a pay-as-you-go basis to avoid debt financing if at all possible. Budgeting for capital projects (and using sinking/reserve funds) outside of operating budget should more accurately reflect the financial position of the Program Office and avoid a previous situation of accumulated fund balances.

Include project management staff as part of capital projects.

Project management and subject matter labor costs should be included in the cost of projects in the capital budget. These positions should be time limited expenses and funded as a load on the

project. Budgeting for labor tied to capital projects would more accurately reflect the cost of the project as well as avoiding a situation where time-limited staff become part of the operating budget.

Create better oversight of the implementation of capital projects.

The Program Office has taken the following steps to improve financial transparency by collaborating with KCIT Project Management, Finance, Business Analysis offices to provide planning and oversight to projects implementation and costs.

Revise PSAP escrow policies to ensure timely reimbursements for eligible expenses.

The Program Office has been collaborating with the IAG to revise escrow policies so that reimbursement eligibility is clear; review and payment process is streamlined and efficient; policies are comprehensive and provide clear guidance on expectations and requirements for both the Program Office and PSAPs.

Work with PSAPs to develop a comprehensive escrow program and policies that govern reimbursements and increase accountability.

The Program office should work with PSAPs to better plan and program for E911 funded expenses. While the current practice of reimbursing against the escrow fund for eligible expenses needs some streamlining (above), additional work to develop PSAP-level expense programs could result in more predictable spending where expenses can be prioritized and show accountability towards supporting the E911 regional system. The Task Force, at a minimum recommends specific policies for:

- The amount of salary and benefits eligible for reimbursement for supported positions at the PSAPs. There is a wide variation of program reimbursable FTE costs. The Exhibit below summarizes FTE costs for GIS and IT PSAP positions supported by the E911 excise tax.
- Escrow fund balances. As shown above, some escrow funds have carried large fund balances. Creating financial management policies for the amount and nature of the fund balances will help PSAPs in their own financial planning and provide more transparency to the E-911 Program and regional governance structure.
- Examine combining the equipment and general revenue distinction into one category. The deployment of ESINetII and system architecture will change the equipment needs of PSAPs that should be reflected in the escrow policy.

Work with PSAP determine an agreed upon basis for allocating tax revenue.

The Program Office has been collaborating with the IAG to create a more transparent escrow funding formula in order to allow for collaborative discussion with the PSAPs on potential revisions to the formula.

Engage the state in tax revenue audits.

The Program Office should work with the State Department of Revenue to audit the compliance rate of for phone line reporting. Given the critical importance of the excise tax revenue, it is imperative that the Program Office and PSAPs have confidence that the phone line basis be accurate.

Recommendation: Create comprehensive and transparent annual financial reporting documentation and performance metrics

The Program Office has taken strides forward to be a more transparent and accountable organization. Further work should strive to solidify these gains in the form of accessible financial documentation with relevant performance metrics. The Task Force believes that annual financial reporting along the lines demonstrated in the Task Force's work would be a good foundation for better trust and accountability for all players in the region's 911 system. Further work between the Program Office and PSAPs could extend or refine these elements. Regardless, the goal of this process would be to create a transparent financial reporting document and process that would meet outside agency audits.

A performance measure is a numeric description of an agency's work and the results of that work. Performance measures are based on data, and tell a story about whether an agency or activity is achieving its objectives, and if progress is being made toward achieving policy or organizational goals. The following list of metrics could include both input and process measures:

- Input Measures
 - Excise tax revenue indexed to operating expenses. This measure responds for the need to examine the adequacy of revenues relative to expenditures. A rolling three-year average can be included for trend analysis.
 - FTE costs as a percent of all expenditures. Monitoring long-term in labor costs is a critical feature of program cost-efficiency.
- Process Measures
 - Performance of budgeted operating and capital expenditures to actual expenditures. Funding and delivering capital projects on-time will guard against unspent capital funds. In addition, feedback on the forecasting operating expenses should help improve budgeting.
 - Percent minimum balance of operating and other reserves. Having reasonable and appropriate fund balances will allow the program to operate and efficient scale while guarding against unexpected economic shocks.
 - Percent of PSAP escrow reimbursement made on-time. Timely reimbursements to PSAP escrow funds will allow PSAPs to better budget and manage their expenses.

System Architecture – Preferred Alternative Summary

This is a summary of “Preferred Alternatives” for System Architecture as discussed by the Technology & Operations Task Force on August 11, 2017 as part of the King County Regional E911 Strategic Plan.

The Task Force has met dozens of times over the last year, and delivered its Second Draft Report on August 7, 2017. To augment that report, each Task Force member was asked to identify a preferred alternative for system architecture. While that discussion did not produce a clear consensus from the group, it did illuminate sound reasoning behind individual choices. These are summarized here.

Note: An additional piece of information became available after the August 7 Report yet in time to inform the preferred alternative discussion. This is a vendor-provided estimate of costs for network connections between the Shared Platform Hosts and the PSAPs in the Single Platform alternative.

Architectural Principles

As a reminder, the Task Force also developed these **Architectural Principles** to guide its work:

1. **Public Safety** – Ensure that 911 services protect the public’s safety above all else.
2. **Security** – All systems and solutions meet at least the minimum levels of security defined.
3. **Fair and Equitable** – Provide fair and equitable access to 911 services so that communities across King County receive and perceive value.
4. **Cost Effectiveness** – Financial decisions are the most cost-effective solutions consistent with documented needs.
5. **Capacity** – The system is designed to meet peak demands without service interruption.
6. **Availability** – Solutions are available at all times without service interruption.
7. **Interoperability** – Software and hardware conform to defined standards of interoperability for data, applications and technology.
8. **Convergence** – Converge toward common solutions, approaches and standards.

Architectural Options

The Task Force narrowed the system architectural options to two:

- Alternative 1 – Distributed Architecture
- Alternative 2 – Single Platform Architecture

Each of these is a viable alternative that meets all of the Principles above and can provide redundant and diverse networking to avoid or mitigate system breakdowns. The primary difference between these architectural platforms is in how the system provides identical yet independent telephony equipment to route 911 calls. Identical yet independent is important so that one can seamlessly replace the other in case of failure. The Task Force extensively compared these alternatives for their alignment with architectural principles, advantages and disadvantages, and cost. The system architecture alternatives and these comparisons are summarized on pages 5-6. The principles and alternative architectures, as well as objectives, actions, and performance metrics are discussed at length in the August 7 Technology & Operations 2nd-Draft Report.

Networking Costs

As explained in the summary on pages 5-6 and in the 2nd Draft Report, the estimated capital cost difference between the system architectural alternatives is relatively modest (\$8.2 million for Distributed; \$7.3 million for the Single Platform). Operating cost differences are also modest (\$0.39

million/year for Distributed; \$0.35 million/year for Single Platform). One meaningful difference is annual networking costs. With the Distributed Architecture, the State of Washington's ESInet-II will provide networking connections directly to all PSAPs. With the Single Platform Architecture, the King County system will need to provide networking connections between the Shared Platform Hosts and the PSAPs. As such, with the Distributed Architecture King County would not face networking costs since the State would pay these costs, but with Single Platform Architecture there are annual costs for this networking to the PSAPs (while the State would continue to provide networking to the Platform hosts). After receiving a vendor-estimate for such a network, the Task Force discussed the need for a diverse network (more than one provider), and ultimately agreed to estimate \$700,000/year for annual networking costs of the Single Platform Architecture. This cost is included in the summary on pages 5-6.*

Alternative Comparisons

As summarized on pages 5-6, the Task Force agrees that both system architectures meet all of the Architectural Principles, and that the Single Platform architectural exceeds all of the principles. Major advantages of the Distributed Architecture are PSAP flexibility, self-sufficiency of PSAPs, and network cost savings. Major advantages of the Single Platform Architecture are increased security, ease of system management, and increased resiliency. Major disadvantages of the Distributed Architecture are increased security complexity, routine maintenance challenges, and duplicated system costs. Major disadvantages of the Single Platform architecture are higher network costs, higher impacts from platform failure, and maintenance troubleshooting challenges. For costs, the Distributed Architecture includes more capital and operating expense, but less (no) annual networking costs than the Single Platform Architecture. In total, the 10-year cost of ownership for the Single Platform Architecture is about one-third higher (Distributed = \$14.0 million; Single Platform = \$19.6 million).

Preferred Alternative

Following completion of their Draft Report, each Task Force member was asked to identify a preferred alternative, along with reasons for selecting their preference, reasons for not selecting the other alternative, and any other issues for further consideration. A tally of individual preferences is below.

Task Force Member	Alt. 1: Distributed	Alt. 2: Single Platform
Fire Districts (Tim Osgood, Woodinville)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County Information Technology (Bill Kehoe)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County E911 Program Office (Deb Flewelling)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County Sheriff's Office (Jessica Sullivan)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Small PSAPs (Micki Singer, Bothell)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
City of Seattle (Russ St. Myers)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
City of Bellevue (Chelo Picardal)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Deaf Community (Kelly Shapard, ADWAS)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Large PSAPs (Jess Nelson, Valley Com)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sound Cities (Ron Tiedeman, NORCOM)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Totals	4	6

Clearly, with a tally of Single Platform-6 | Distributed-4, the Task Force does not have consensus, but it is useful to reiterate, that the Task Force does agree that either System Architecture will meet all of the Technology & Operations Principals.

It is also useful to understand the reasoning behind the preferences and concerns. In summary, these are:

- **Single Platform preference: Stronger principles alignment; operations and upgrade efficiency**

Selected comments:

- *"Highest rating for all eight technology principles"*
- *"Resilient, interoperable; higher degree of security; easier to adapt or upgrade"*
- *"Redundancy (dual network); Resiliency (geo-diverse cores)"*
- *"Security; ease of system management; increased resiliency, etc."*
- *"Host nodes can be located in different locations for resiliency"*

- **Distributed preference: Cost; PSAP flexibility**

Selected comments:

- *"Cost and control; ensuring PSAPs have a voice and a vote on decisions that significantly impact their operations and budgets."*
- *"Flexibility for PSAPs: This is direct with distributed; control is at County with platform"*
- *"Cost: \$6 million over 10 years cannot be ignored."*
- *"There are systems costs beyond Technology & Operations"*
- *"Resiliency inherent with the architecture in dealing with a focused malicious attack."*
- *"Cost effectiveness; PSAP flexibility"*
- *"Convergence and Interoperability through ESnetII"*
- *"Almost immediate solution to NG911;*
- *"Impacts on PSAPs are minimal and predicable"*

- **Concerns about Single Platform: Risk of malicious attack; cost; risk of unknowns**

Selected comments:

- *"Cost: \$6 million over 10 years cannot be ignored." "Too expensive"*
- *"If a comprehensive financial model exists to make the single platform achievable without unnecessarily increasing the burden on PSAPs, and PSAP control interests are addressed, then we can support the Platform alternative."*
- *"Provides marginal benefit when both systems meet established requirements. Finance Task Force may identify fiscal considerations not fully vetted here."*
- *"High impacts from platform failure, especially for life and death risk."*
- *"Maintenance and troubleshooting challenges."*
- *"Many qualities, but if the focus of a persistent, malicious attack, the impact would be much more severe than the same attack on a single PSAP."*
- *"Risk: Under single platform, the county system bears more of the risk since much of the network is not through ESnetII. Single platform fiscal, implementation, and configuration complications are not fully understood."*

- **Concerns about Distributed: Complexity; weaker principles alignment; operations & security challenges**

Selected comments:

- *"Lower ratings for most technology principles"*
- *"Less redundancy, resiliency, and consistency"*
- *"Too much reliance on state & ESnetII"*
- *"Security risks and lack of security standards"*
- *"Routine maintenance challenges; duplicated costs; security vulnerabilities"*
- *"More complex to manage, maintain and enhance over time"*

Other considerations noted during this conversation included:

Selected comments supporting single platform:

- *“Operational model and costs from a program perspective”*
- *“Potential vulnerability to security threats such as network or telephony denial of service attacks, and possibility to affect all PSAPs simultaneously (versus only one PSAP in distributed).”*
- *“Ongoing long-term costs, especially for resilient/redundant networking.”*
- *“Illustrate operational scenarios for Planning Group between both systems.”*

Selected comments supporting distributed:

- *“Governance and technology decision-making going forward will be important.”*
- *“Remote location is important for natural disaster.”*
- *“Unknown network cost (this concern was partially addressed when the vendor estimate came in).”*
- *“Governance: We need some system that allows future technology efficiencies, regional operability and opens dialogue to a mechanism that allows fair and equitable decisions is needed.”*

Process Update Note:

On August 21, the Planning Group met to consider the Technology & Operations 2nd Draft Report and Preferred Alternative analysis. At that meeting, the Planning Group had a robust discussion, and agreed to recommend the Technology & Operations recommendations to the Leadership Group. Additionally, the Planning Group voted to recommend Alternative 2: Single Platform as the preferred choice for system architecture. At this meeting, 8 of the 11 members of the Planning Group were present in person or on the telephone. For the system architecture recommendation, the vote was 6 for the Single Platform Architecture, 1 for the Distributed Architecture, and 1 abstention. At 6 to 1, the vote showed 85.7% in favor of the Single Platform Architecture, which meets the 80% threshold required for a recommendation.

It is also worth noting, that of the three Planning Group members not available to vote, two had expressed support for the Single Platform Architecture. The preference of the other Planning Group member not present was not known.

E911 Technology and Operations Task Force Architecture Comparison Summary

Alignment to Principles:

Principle	Alt 1 – Distributed Architecture	Alt 2 – Single Platform
Public Safety	✓+	✓+
Security	✓	✓+
Fair and Equitable	✓	✓+
Cost Effective		
Capacity	✓	✓+
Availability	✓+	✓+
Interoperability	✓	✓+
Convergence	✓	✓+

✓ meets principles. ✓+ exceeds principles.

Major Advantages and Disadvantages:

	Alt 1 – Distributed Architecture	Alt 2 – Single Platform
Advantages	<ul style="list-style-type: none"> • PSAP Flexibility • Self-Sufficient PSAPs • Network Cost Savings 	<ul style="list-style-type: none"> • Increased Security • Ease of System Management • Increased Resiliency
Disadvantages	<ul style="list-style-type: none"> • Increased Security Complexity • Routine Maintenance Challenges • Duplicated System Costs 	<ul style="list-style-type: none"> • Higher Network Costs • Higher Impacts from Platform Failure • Maintenance and Troubleshooting Challenges

Cost Comparison:

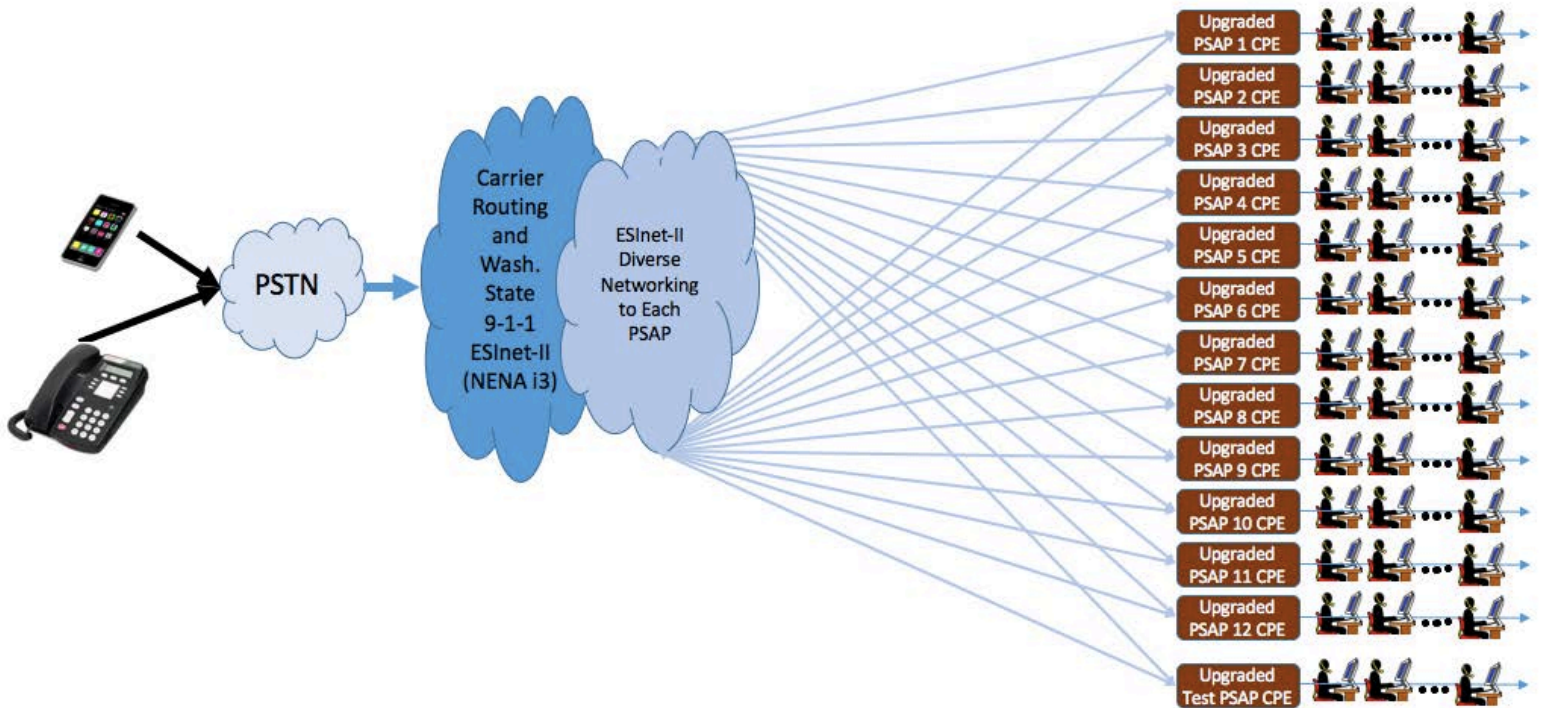
	Alt 1 – Distributed Architecture	Alt 2 – Single Platform
One-Time System Implementation Costs (CAPEX) ¹	\$8,181,217	\$7,337,930
Annual System Maintenance Costs (OPEX) – 1 st year ¹	\$385,846	\$348,899
10-year OPEX (incl. refresh x2) ¹	\$5,829,008	\$5,246,374
Annual Networking Costs ²	\$0	\$700,000
10-year Networking Costs ²	\$0	\$7,000,000
Total: 10-year Cost of Ownership	\$14,010,225	\$19,584,304

¹ CAPEX and OPEX system costs based on median of cost estimates received.

² Networking costs is a placeholder for the two networks for Single Platform (pending vendor estimate is likely to be lower).

E911 Technology and Operations Task Force Architecture Comparison Summary

Alternative 1 – Distributed Architecture



Alternative 2 – Single Platform Architecture

