

WASHINGTON STATE NEXT GENERATION 9-1-1 PLAN

**The NG 9-1-1 Subcommittee
Report To the
Washington Enhanced 9-1-1 Advisory Committee**

**ADOPTED JULY 21, 2011
Version 16**

TABLE OF CONTENTS

NG 9-1-1 Subcommittee Objectives NG 9-1-1 Committee Members	2
Executive Summary	3
The Early E9-1-1 System in Washington State	5
NG 9-1-1 and Overview of E9-1-1 Modernization	9
NG 9-1-1 Current State of the System in Washington State	10
Figure 5 NG 9-1-1 Proposal	12
Figure 6 Washington State NG 9-1-1 Network	13
The Washington State Next Generation 9-1-1 Network	13
NG 9-1-1 Planning Diagram	16
The Costs of Modernization for the Statewide E9-1-1 System	17
Figure 8 Costs to Transition to NG 9-1-1	18
Equipment Centralization Better Efficiency and System Economics	19
NG 9-1-1 Subcommittee Telephone Equipment Hosting Plan	20
Options Reviewed by Committee	21
Phase 3 steps to get to full I3 NG 9-1-1	22
Project Completion Timeline to full I3 NG 9-1-1	24

NG9-1-1 SUBCOMMITTEE

In March 2007 the Enhanced 9-1-1 (E9-1-1) Advisory Committee established a Next Generation 9-1-1 subcommittee

Objective

The Subcommittee will work to make technical and operational recommendations for the modernization of the statewide E9-1-1 system for consideration by the Washington State E9-1-1 Advisory Committee for consideration. It will enlist members to serve on the committee that have the expertise to ensure recommendations embody best practices, and result in a modernized system that exceeds our existing E9-1-1 system in the areas of: security; speed of delivery; reliability; and redundancy; and has the ability to receive voice and data from any device or service that can access 9-1-1, anytime and anywhere in Washington state. The committee will recommend changes that will ensure both efficiency and the most economical operation of the statewide system.

NG 9-1-1 COMMITTEE MEMBERS

Jim Quackenbush	Marlys Davis	Mary Allen
Keith Flewelling	Wayne Wantland	Lorlee Mizell
Deb Welsh	Markus Volke	Millie Tirapelle
Jean Nealy	Rose Parr	Laura Caster
Richard Kirton	Rebecca Beaton	Jacqueline Randall
Glenn Tharp	Peggy Fouts	Debby Grady

In addition, vendor representatives included:

Seth Senenthal & John Hunt – TCS

Ashish Patel, Paul McLaren, Steve Raval – Intrado

Jeff Glenn, Dennis Luttrell & Ron Shelton – Qwest/Century Link

Tim DiMarco – Cassidian

This group of dedicated professionals have worked tirelessly to produce this July 2011 update to the NG9-1-1 Plan for presentation to the Washington State E 9-1-1 Advisory Committee for recommended adoption at the July 21, 2011 Committee meeting.

EXECUTIVE SUMMARY

Prior to 2010, the Enhanced 9-1-1 (E9-1-1) telephone network technology in place in Washington State was designed in the 1960s and remained nearly unchanged. Although extremely reliable the network couldn't keep up with the explosion of technological advancements flooding the market and was not capable of processing widely used data such as text messaging, photos, video or telematics from vehicles.

The replacement of the current E9-1-1 network and data base began with a proof of concept migration to an IP based network (ESInet) for eight (8) selected county public safety answering points (PSAPs). The proof of concept phase was completed by the end of 2010. The success of the proof of concept prompted the migration of the remaining thirty one (31) counties in 2011. As of this writing, over 88% of the PSAPs have completed the migration to the ESInet and database; with all thirty-nine (39) counties expected to be migrated by September 30, 2011.

The ESInet and data base is the first significant step toward preparing for the delivery of additional data necessary for an effective public safety response. The changes have improved the call set up time and speed of delivery to the PSAP for voice calls. The ESInet replaces the 3 previous service providers' (Qwest, Embarq [formerly Sprint], and Verizon) analog networks and provides the ability for call load balancing and host equipment sharing through the centralization of equipment. The latter will allow counties to retain local control over how 9-1-1 calls are handled, while minimizing the associated costs and ensuring the most efficient use of 9-1-1 tax revenues.

The transition to NG9-1-1 will not occur overnight, and was planned in phases over 5 -7 years based on planned equipment configuration and costs. Proceeding in phases built confidence in the new network and database demonstrating its reliability and its advantages over the old system. The following describes the phased transition:

Phase 1 (Funded) - A state contract was awarded to Qwest and Intrado for a Next Generation 9-1-1 network and database pilot project in Benton, Ferry, Island, Lewis, Skamania, Spokane, Thurston, and Yakima Counties. Status: **COMPLETED**.

Phase 2 (Funded) – Implementation of the Next Generation 9-1-1 network and database in the remaining 31 Counties and Washington State Patrol E9-1-1 Public Safety Answering Points. Status: IN-PROGRESS, 88% of PSAPs completed; scheduled final completion date September 30, 2011.

Phase 3 (Progress directly limited by annual revenue) – Consolidation of equipment and implementation of i3 capability at all PSAPs. This is the final phase that results in full digital to digital voice and data from start to finish. It is the most time consuming and expensive phase of the modernization. This is an implementation phase.

Three options for centralization and hosting of equipment are being examined to ensure the best plan for the system will be put in place as part of Phase 3.

1. PSAP owned equipment and sharing of hosted equipment between multiple PSAPs
2. Commercially hosted centralization of equipment; or,
3. Combination of both

The selections will be determined based on effectiveness, system benefits, and cost. Additional issues to evaluate include upgrade or replacement of 9-1-1 telephone equipment to Session Initiated Protocol (SIP), upgrade of the Computer Aided Dispatch (CAD) systems and upgrade or replacement of logging recorder systems to accept digital voice and data associated with full i3 Next Generation 9-1-1 in accordance with national 9-1-1 standards, long term maintenance costs, diversity, and system security.

9-1-1 officials in each county must decide what data will be directly accessible to call receivers and what should only be accessible to public safety responders. This will require routing data to appropriate servers that can either be accessed by call receivers and mobile computers in the field, or be limited. This is important to prevent an overload of information for processing by call receivers.

The migration of the E9-1-1 system through the final phase requires keeping portions of the legacy system in place during that migration. It will also allow time for communications companies to upgrade their equipment to IP capable processing of voice and data completing full i3 NG9-1-1.

Based on costs through i3 NG9-1-1 and the projected revenues it is expected that the modernization effort will be completed by December 2017.

THE EARLY E9-1-1 SYSTEM IN WASHINGTON STATE

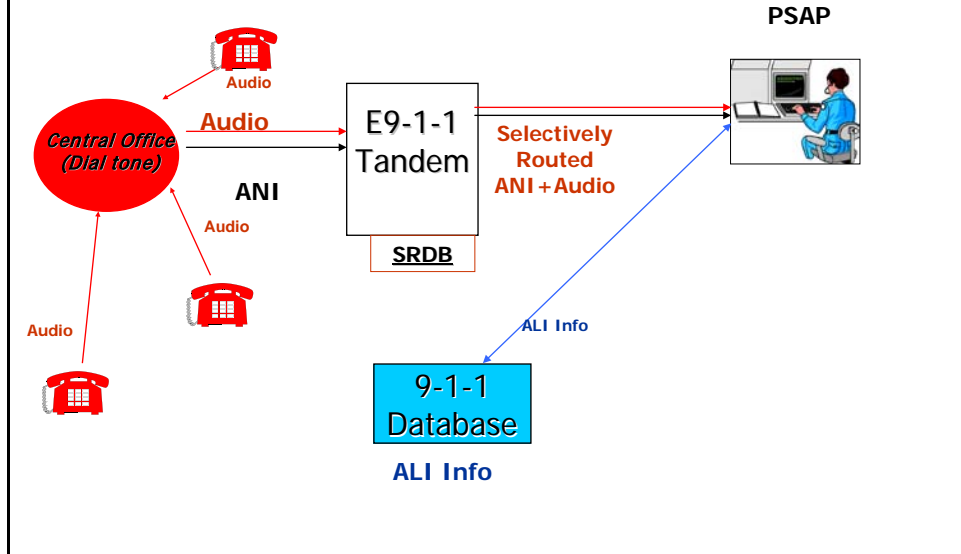
The legacy E9-1-1 network in Washington prior to beginning the migration to an IP network (ESInet) was a patchwork of three separate networks maintained by Qwest, Embarq, and Verizon. The service areas are shown below.

Table 1 E9-1-1 Service Areas				
Qwest			Embarq	Verizon
Adams	Grays Harbor	Pierce	Klickitat	Benton
Asotin	Jefferson	San Juan	Skamania ^a	Island
Chelan-Douglas	King	Skamania ^a		Skagit
Clallam	Kitsap	Spokane		Snohomish
Clark	Kittitas	Stevens		
Columbia	Lewis	Thurston		
Cowlitz	Lincoln	Wahkiakum		
Ferry	Mason	Walla Walla		
Franklin	Okanogan	Whatcom		
Garfield	Pacific	Whitman		
Grant	Pend Oreille	Yakima		

Notes:

- a. Skamania County is served by Qwest on its western side and Embarq on the county's eastern side.

Figure 2
Wireline Enhanced 9-1-1



In a traditional landline environment, a caller dials 9-1-1 from his or her landline telephone. The audio, or voice, is routed through a secure and dedicated network, along with the caller's telephone number (or ANI, for Automatic Number Identification) to the Selective Router. The Selective Router compares the customer ANI with the routing instructions in the Selective Router Database (SRDB), and selectively routes the 9-1-1 call (audio and ANI) to the appropriate PSAP. Special E9-1-1 call-taking equipment at the PSAP takes the telephone number (ANI) and queries the 9-1-1 database for the caller's Automatic Location Information (ALI), along with the appropriate emergency response agencies. That information is sent back to the PSAP for display on the 9-1-1 call-receiver's screen.

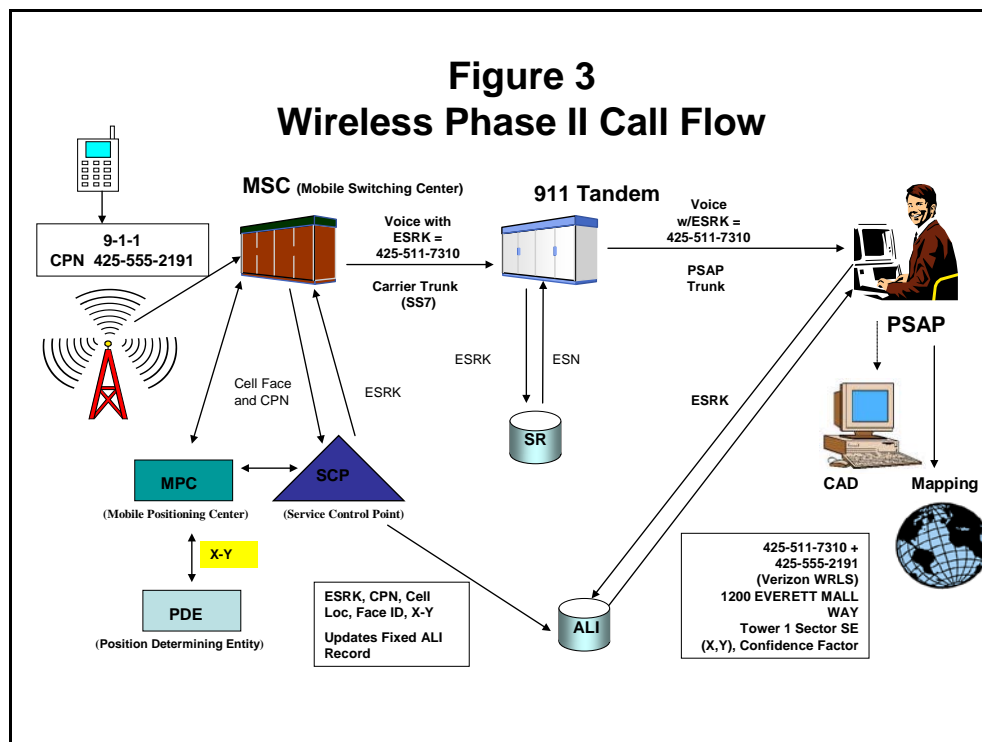
An important part of the entire process described above is placement of the caller's location information in the 9-1-1 database. The information in the 9-1-1 database is provided by two groups. First, the 9-1-1 Authority (in Washington, the 9-1-1 Authority is the 9-1-1 County Coordinator) who maintains an existing Master Street Address Guide (MSAG). The MSAG is a tabular database of street names and house number ranges with corresponding Emergency Service Zones (ESZ), and Emergency Service Numbers (ESNs). The ESN enables the proper routing of 9-1-1 calls.

The second group is the communications carriers. When an individual signs up for telephone service, the Incumbent Local Exchange Carrier (ILEC) or competitive LEC (CLEC) updates the database management system (DBMS) with a new, changed, or deleted service address, customer name, calling number, and other information.² The

² According to the E9-1-1 Institute, with respect to wireless carriers and nomadic VSPs, customer data typically consists of "pseudo" records and third party database access instructions.

DBMS verifies the validity of the customer record against the MSAG, and loads that data into the 9-1-1 database, as well as the SRDB.

The introduction of wireless technology did not significantly affect the infrastructure of the E9-1-1 system. The change from landline to wireless was mitigated by service providers that translated wireless/cellular 9-1-1 calls to mimic landline 9-1-1 calls so they could be received and processed by PSAPs. Figure 3 below provides a network diagram of a Phase II wireless E9-1-1 call. In summary, a wireless 9-1-1 call routes from the serving Mobile Switching Center (MSC), which is essentially a wireless central office. From the MSC, the wireless 9-1-1 call travels on a dedicated network to the serving Selective Routers, where the call is then routed to the appropriate PSAP. When the PSAP queries the ALI database, there are instructions to route the request to the appropriate wireless ALI database. Unfortunately, the system cannot provide a caller's specific location, as with landline E9-1-1. It is ironic that the system built to handle landline E9-1-1 traffic now handles more wireless than landline 9-1-1 calls.



NG9-1-1 and Overview of E9-1-1 Modernization

Much work has been done in many forums to design a 9-1-1 network and system to meet consumer expectations and improve the quality of 9-1-1 service and public safety. Nationally the plan is for an IP network where 9-1-1 “callers” can use any analog or digital device to access and request emergency assistance from an IP capable PSAP. This vision is called Next Generation 9-1-1 (NG9-1-1), according to the National Emergency Number Association (NENA),

“...NG9-1-1 is...an IP based replacement for E9-1-1 features and functions that support all sources of emergency access to the appropriate PSAPs, operates on reliable, secure, managed multi-purpose IP networks, and provides expanded multimedia data capabilities for PSAPs and other emergency responders....”

In other words, NG9-1-1 is a secure, private managed IP-based network to process and manage multi-media services such as voice and text messaging, data, and video. Once fully implemented, NG will

- Facilitate 9-1-1 call and data sharing;
- Provide a robust, redundant, and secure statewide emergency network;
- Provide equal access for all 9-1-1 callers, particularly the deaf and hard of hearing;
- Allow emergency responders to be better prepared for situations prior to arriving on the scene, potentially saving more lives;
- Provide significant benefits in disaster planning and recovery;
- Facilitate and enable Incident/Mutual Aid Collaborations;
- Make greater use of information from outside sources;
- Provide efficient statewide backup and overflow during crises, periods of high call volume, and planned and unplanned outages;
- Support current and future communications devices.

NG9-1-1 Current State of the System in Washington State

The transition to NG9-1-1 is well underway with the first two phases nearly completed at the time of this revision. Now that the i3 standard has been adopted (June 2011) both vendors and PSAPs can begin plans for the completion of the final phase with a projected completion in 2017. This final phase will require extensive and expensive changes. That currently requires the temporary co-existence of the old legacy network with the new ESInet that will be fully deployed statewide by September 30, 2011. Before a PSAP can take advantage of additional data such as : text messaging; photos; video and telematics, the PSAP equipment, including E9-1-1 call-taking equipment,³ Computer-Aided Dispatch (CAD), mapping, and other support equipment, must be upgraded or in some instances replaced. This is due to the fact that the equipment currently associated with a 9-1-1 call must be capable of receiving, displaying, and storing these new IP data elements using the recently adopted i3 functional and interface standards. In addition, call-receivers will need training to understand the new processes and obtain the ability to manage all the additional data that may be provided directly to them.

Implementation of NG9-1-1 in Washington State is occurring in three phases.

Phase 1 (Funded)- Network and database pilot project in Benton, Ferry, Island, Lewis, Skamania, Spokane, Thurston, and Yakima Counties, in accordance with adopted national standards. http://www.nena.org/sites/default/files/08-001_20051205.pdf this is the link to i2 “Interim VoIP Architecture (i2)

Phase 2 (Funded)– Network and database implementation in the remaining 31 county and Washington State Patrol E9-1-1 Public Safety Answering Points. http://www.nena.org/sites/default/files/08-001_20051205.pdf this is the link to i2 “Interim VoIP Architecture (i2)

Phase 3 (Progress directly limited by annual revenue) – The final modernization phase will result in full digital-to-digital voice and data from start to finish. It is also the most time consuming and expensive phase of the modernization that must be categorized as a new implementation phase. This phase will include the centralization and hosting of PSAP telephone equipment, (this may include PSAP owned equipment and sharing of hosted equipment, commercially hosted centralization of equipment or a combination of both and should be determined based on cost and the effectiveness of the chosen solution), an upgrade or replacement of 9-1-1 telephone equipment to Session Initiated Protocol (SIP), upgrading Computer Aided Dispatch (CAD) systems, and upgrade or replacement of logging recorder systems to accept digital voice and data associated with full i3 Next Generation 9-1-1 in accordance with national 9-1-1 standards. This will allow the 9-1-1 Public Safety Call Receivers to receive and process

³ 9-1-1 call-taking equipment is often referred to in the 9-1-1 industry as Customer Premise Equipment (CPE).

NG9-1-1 data and to access the NG9-1-1 features.

<http://www.nena.org/sites/default/files/08-002%20V1%2020071218.pdf> this is the link to i3 “NENA Functional and Interface Standards for Next Generation 9-1-1 Version 1.0 (i3) This will allow the 9-1-1 Public Safety Call Receivers to receive and process NG9-1-1 data features.

The Washington Military Department (E9-1-1 Program Office) signed a contract with Qwest/Intrado on September 11, 2009 for provision of the ESInet and Database.

Subcommittee Recommendations

- The NG9-1-1 system must be implemented in accordance with national standards. The proposed NG9-1-1 system is illustrated in Figure 5 in the following section. Figure 6 illustrates the network portion of Phases 1 & 2.
- The State E9-1-1 Program Office should manage the network and the gateways/access points at the ingress and egress of the network. The State E9-1-1 Program Office needs to ensure the security and reliability of the network, and must therefore own or at least control access to the network.
- The network must be capable of performing to the *5-9’s Standard*, which establishes a system up time or operational at 99.999 percent of the time. Compliance with this standard means that in one year, the system may not be down for more than five minutes. This standard is essential for the effective operation for E9-1-1 service.
- The Washington Administrative Code (WAC) be updated to reflect any changes to the RCW and to ensure that the transition occurs in the most cost effective and efficient manner possible.
- Recognizing the migration to Phase 2 is nearly completed it’s important that Phase 3 follow in close succession to avoid additional costs associated with maintaining dual networks.

Note: Dual networks are only being maintained for a PSAP until it accepts the ESInet. There was a misconception that all current Legacy costs would go away once the ESInet and NG9-1-1 equipment were fully implemented. That was false. Some Legacy costs (approx. \$380,000/month continue even after NG9-1-1 is fully implemented. Future reductions are only due to anticipated decreases in wireline database costs.

Figure 5

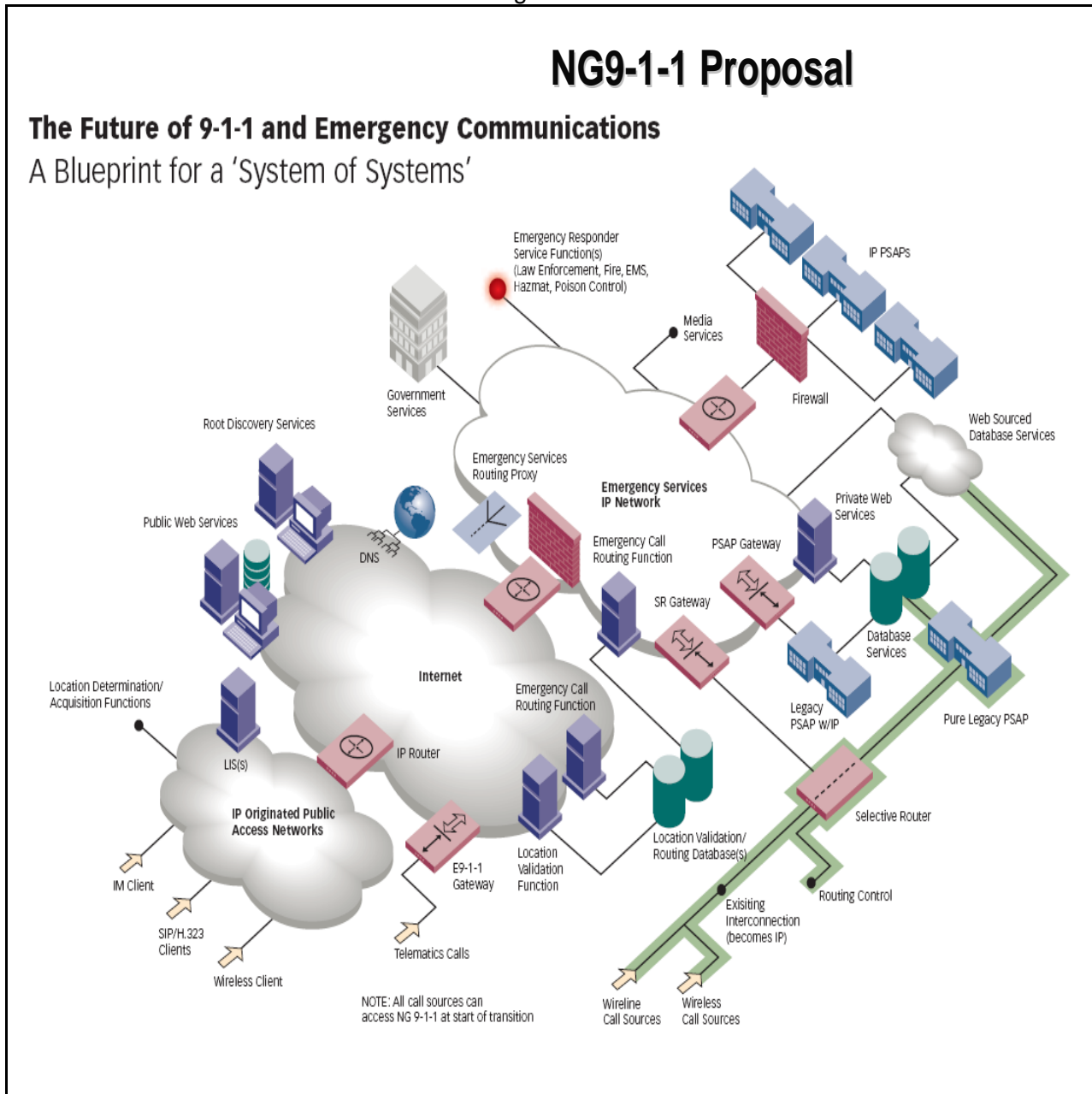
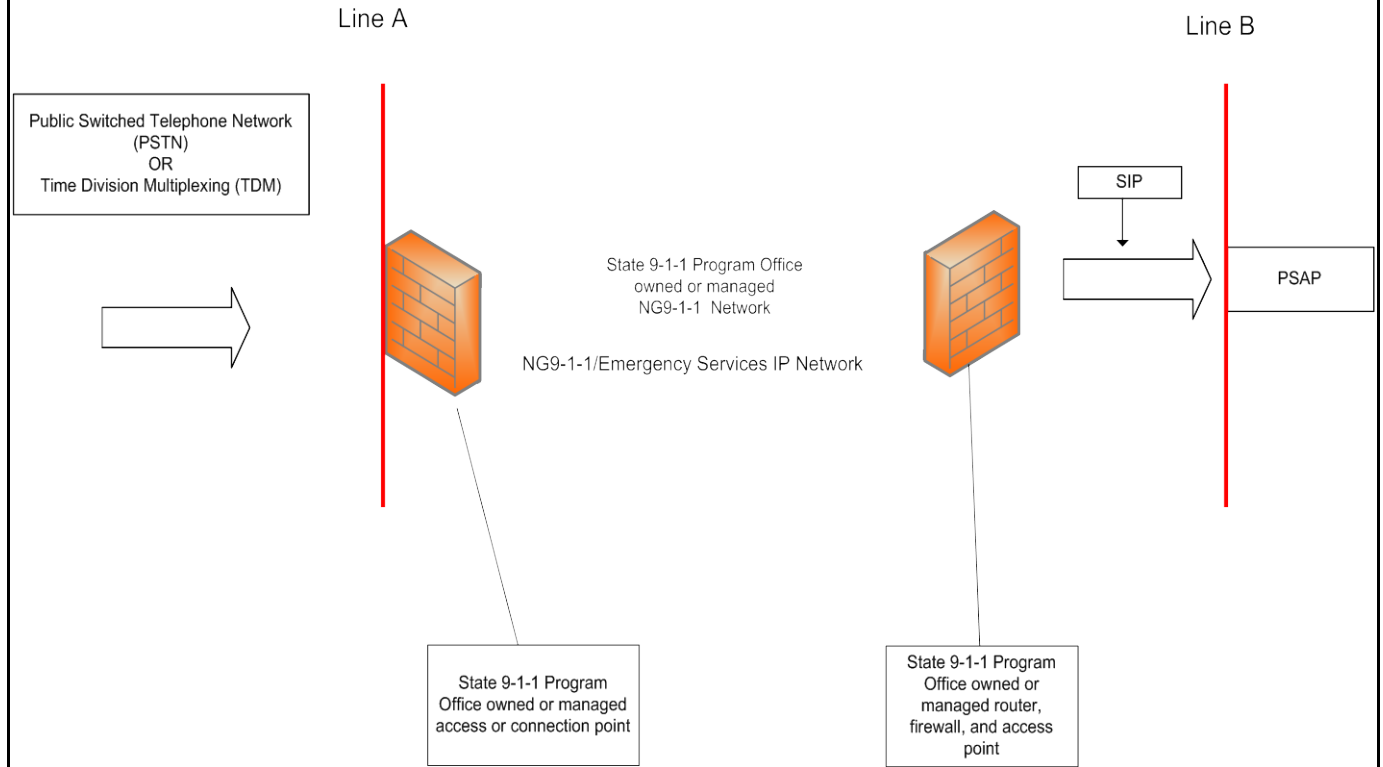


Figure 6
Washington State
NG9-1-1 Network



The Washington State Next Generation 9-1-1 Network

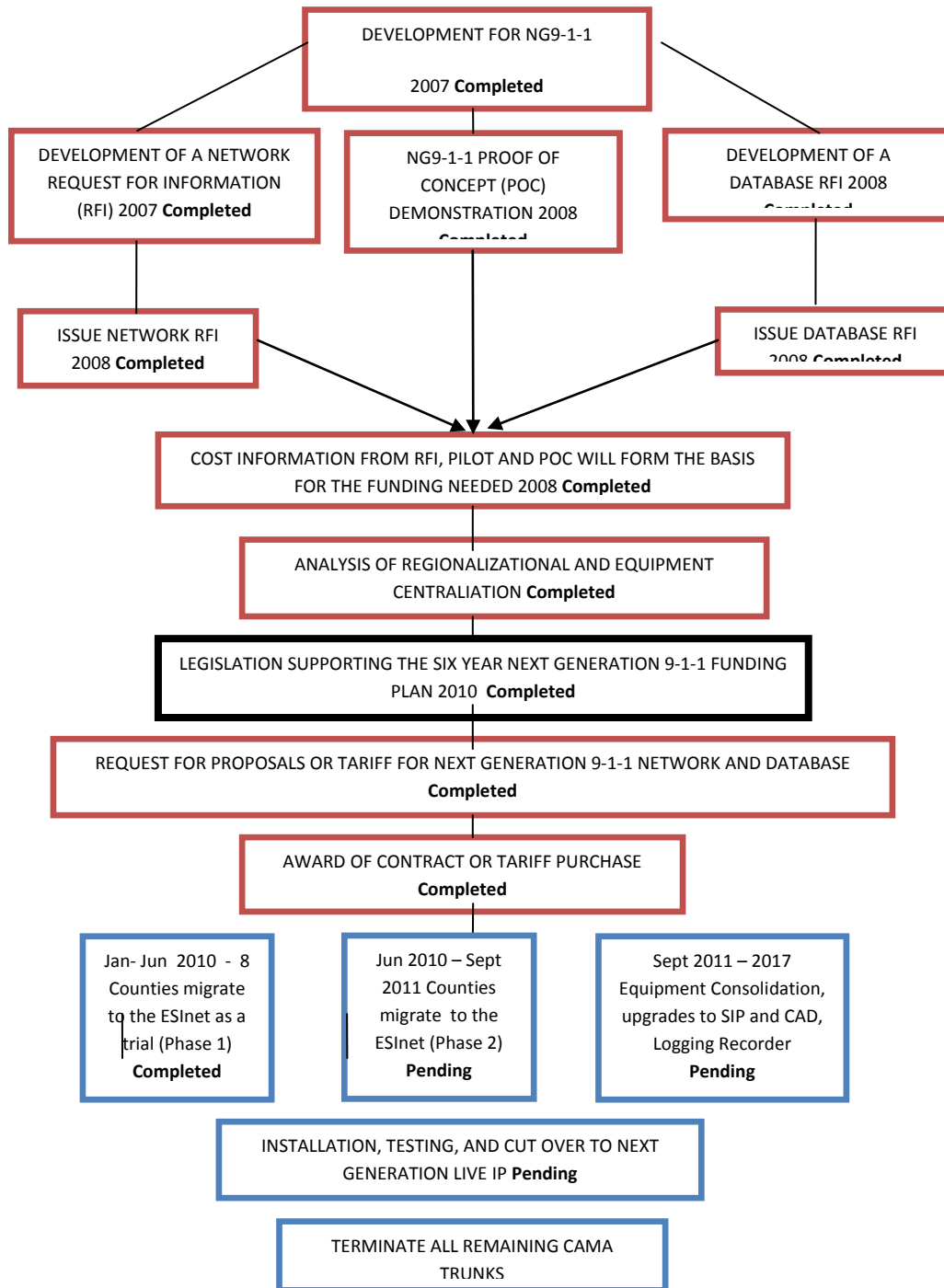
Following is a list of requirements and assumptions concerning the NG9-1-1 Network:

- In the NG9-1-1 environment, any device capable of accessing 9-1-1 service will be able to connect through the device's carrier or provider.
- The consumer will access 9-1-1 from a wireless personal communications device, landline phone, VoIP service, etc. The voice and/or data will be delivered to the PSAP at one time, instead of separately as today. The call will enter the IP cloud via a gateway, which will also route the call.

- All carriers/providers will need to connect to the State E9-1-1 Program Office owned or managed IP Connection Point, which will convert the analog signal to IP.
 - Each provider will have to provide its own access to the gateway, and shall have to meet state standards and requirements for access. Each provider shall be responsible for the costs of connecting to and meeting the gateway requirements, including Automatic Location Identification (ALI) data, MSAG validation, and selective routing or providing for the originating Emergency Services Routing Proxy (ESRP).
- All data and voice from the IP cloud to the PSAP will be IP-based, via Session Initiated Protocol (SIP). PSAPs will have to meet state requirements for access, firewall, level of service, and CPE capability, among others.
- There will need to be a router, firewall, etc., between the originating border control and the terminating border control of the IP cloud and PSAPs.
- The network should be Multiple Protocol Label Switching (MPLS) or equivalent. Local governmental agencies will continue to retain control over their respective emergency response functions, including call-receivers. Local jurisdictions will also retain responsibility for managing their respective MSAGs and mapping.
- Implementation of NG9-1-1 will foster the migration to the centralization of equipment and hosting of equipment. This may include PSAP owned equipment and sharing of hosted equipment, commercially hosted centralization of equipment or a combination of both and should be determined based on overall cost and the effectiveness of the chosen solution. That is, 9-1-1 “calls” will continue to be received locally, but the host equipment can be shared across multiple PSAPs or counties. Where it makes sense, the network should be used to facilitate the pooling of operational and capital resources.
- The State E9-1-1 Program Office will need to control access to the network.
- The State E9-1-1 Program Office should be responsible for the costs associated with the gateways and the clouds. That is, from Figure 6 above, the State E9-1-1 Program Office should be responsible for the costs inside Lines A and B.
- PSAPs will be responsible for the costs to the right of Line B. It should be noted that the State 9-1-1 Office will continue to pay PSAP costs to the right of Line B. This diagram is only used to mark the various points of responsibility.

- Service providers will be responsible for the costs to the left of Line A.
- The State E9-1-1 Program Office will need to set standards and specifications, with the advice and assistance of the E9-1-1 Advisory Committee, designed with sufficient capacity to support all legacy and IP applications for statewide public safety needs.
- The network should be robust and designed with sufficient diversity and redundancy to ensure survivability. No single point of failure should be able to significantly impact the day-to-day 9-1-1 and PSAP operations. The network needs to support the new and evolving NENA technical and operating standards for IP networks and 9-1-1 call-taking equipment.
- The Subcommittee recommends that the State E9-1-1 Program Office set standards for voice compression and Quality of Service (QOS).
- The State E9-1-1 Program Office should require diverse routing from the PSAP to the first Point-of-Presence (POP) in the IP network, with the realization that technology and cost factors may require some adjustments to that standard.

NG 9-1-1 Planning Diagram



The Costs of Modernization for the Statewide E9-1-1 System

The subcommittee has worked together with the E9-1-1 State Program Office staff and vendor representatives to determine the costs of modernizing the statewide E9-1-1 system in each of the 3 phases of NG9-1-1.

Costs today include Phase 1 & 2 by having put in place the new NG9-1-1 network or ESInet, a new IP based database (both of which are nearly completed), and the cost of keeping the existing legacy 9-1-1 network operating until the new network is capable of supporting 9-1-1 with the same or better speed, reliability and redundancy. Note: Dual system is maintained only until the PSAP accepts the ESInet migration.

The State has contracted with Qwest/Intrado to provide that network and database for our state. Therefore the costs represented are based on existing contract pricing.

To take advantage of the ESInet capabilities and promote efficiencies and reduce costs of the 9-1-1 system may require the centralization and hosting of equipment. This may include PSAP owned equipment and sharing of hosted equipment, commercially hosted centralization of equipment or a combination of both and should be determined based on overall cost and the effectiveness of the chosen solution. It is planned that this effort will reduce the number of full 9-1-1 switches. It will also include upgrading or replacing the current telephone systems to Session Initiated Protocol (SIP), upgrading Computer Aided Dispatch (CAD) systems and upgrading or replacement of logging recordersw (archive and recovery) associated PSAP equipment. This element relies on costs identified in the 2008 Kimball Consultant Study document prepared for the State E9-1-1 Program Office, and committee members, As part of the study, the State E9-1-1 Program Office staff as well as vendors provided input. The subcommittee agrees that the use of both has provided the most accurate projections to on which to base costs for Capital Purchases and Installation costs, Recurring costs commercial hosting, and annual maintenance on.

The Consolidation of equipment will provide an opportunity for producing greater long term efficiencies through sharing of both equipment and technical assistance for the maintenance of that equipment be it PSAP owned or commercially supplied.

The cost of doing nothing will result in a break of faith to citizens that expect the increased 9-1-1 excise tax that became effective in 2011 to move the modernization of 9-1-1 forward to address current and future needs of our citizens in a reasonable time frame. However progress toward full NG9-1-1 will stall. The costs will increase for the migration to NG9-1-1 due to rising costs of equipment, labor costs and will result in the splintering of our consistent statewide system into counties that can partially fund the migration and move forward leaving behind those that are unable due a lack of funds.

This will result in inconsistent levels or of 9-1-1- to serve the emergent needs of our citizens.

The following “Costs to Transition to NG9-1-1”, Figure 8 spreadsheet and graph offers a notional summary version of the transitional costs by Biennium. The detail that formed the basis for this summary version are contained in Appendix 1.

FIGURE 8

Biennium	2009 - 2011	2011 - 2013	2013 - 2015	2015 - 2017
State E9-1-1 Revenues	\$43,448,731	\$49,621,200	\$51,625,382	\$53,711,048
COUNTY CONTRACTS	\$ 15,500,000	\$ 16,000,000	\$ 16,000,000	\$ 16,000,000
CONTRACTED STATEWIDE SERVICES (I.E. CJTC, LANG LINE TTY TRAIN ETC.)	\$ 1,500,000	\$ 1,800,000	\$ 1,800,000	\$ 1,800,000
E9-1-1 OFFICE	\$ 2,200,000	\$ 2,600,000	\$ 2,600,000	\$ 2,600,000
LEGACY NETWORK EXPENSES	\$ 16,045,596	\$ 11,227,172	\$ 8,870,788	\$ 8,649,788
NG9-1-1 NETWORK & DATA BASE EXPENSES	\$ 4,604,625	\$ 15,853,000	\$ 18,503,000	\$ 18,282,000
NG9-1-1 EQUIPMENT AND INSTALLATION EXPENSES	0	\$ 9,500,000	\$ 8,200,000	\$ 8,400,000
TOTAL EXPENSES	\$ 39,850,221	\$ 56,980,172	\$ 51,973,788	\$ 55,731,788
NET REVENUE	\$ 3,598,510	<\$7,358,972>	<\$4,348,406>	<\$2,020,740>
BEGINNING FUND BALANCE	\$ 7,223,099	\$10,821,609	\$ 5,603,665	\$ 3,851,594
ESTIMATED ENDING FUND BALANCE		\$ 3,462,637	\$ 1,255,259	\$ 1,830,854

EQUIPMENT CENTRALIZATION BETTER EFFICIENCY AND SYSTEM ECONOMICS

The subcommittee recognizes and respects the constitutional right of home rule in Washington State. Therefore the decision on regionalization of 9-1-1 centers into multi-county operations is indeed a local decision. The committee recommends that the State E9-1-1 Program continue to support regionalization efforts both economically and operationally.

The subcommittee also recognizes that it is the responsibility of the State E9-1-1 Program to efficiently and economically support E9-1-1 services statewide. A concept that may achieve these goals while recognizing local control is the centralization of common equipment that can be shared among multiple 9-1-1 centers. This can be achieved through the centralization of PSAP owned equipment hosting for other counties, and/or through commercial carrier hosting as two known options. As such, the subcommittee recommends that the state E9-1-1 Program pursue the centralization of equipment to ensure both efficient and the most economical statewide NG9-1-1 system possible using the following guidelines :

- Consider what would result in the most economical configuration
- Consider which technological solution would result in the most efficient reliable and secure delivery of emergency 9-1-1 calls.
- Consider that local customization, as needed, can still be provided
- E9-1-1 service to the public is not degraded

The following Map demonstrates the current distribution of vendor specific 9-1-1 telephone equipment by county, statewide. It also depicts a notional centralization of equipment plan without a determination on the use of PSAP owned CPE or the use of commercial hosting. That determination will be finalized at the time of commitment.

The map titled “Telephone Equipment Hosting Plan” following this section has been prepared based on a survey prepared by the NG9-1-1 committee and sent to all counties, and the Washington State Patrol. The survey results and subsequent review by the committee revealed several important elements. First, the Counties of King, Pierce and Snohomish, where multiple PSAPs exist are comfortable with consideration of a Hub/Remote arrangement. However each would likely limit this arrangement to serve just their county because of the size, population served and number of current PSAPs. Both King and Pierce County governments are considering consolidation of PSAPs though no final decision or configuration has been released.

It also revealed that based on the large number of Positron platform counties, a Hub should be limited in the number of remotes to avoid overloading. This may prove not to

be a factor in a commercial hosted arrangement, but that will need further research to validate.

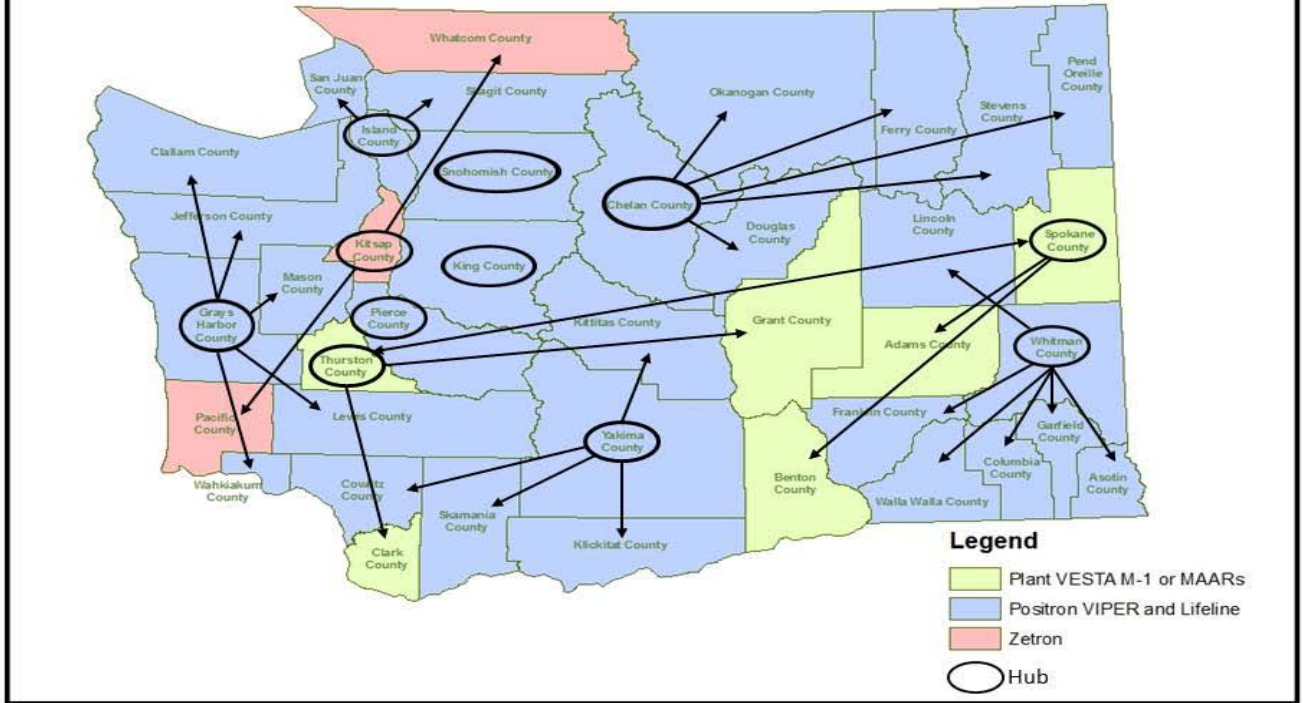
Because this is a home rule state, each county is responsible for choosing the platform of its choice. However any platform must meet the State E9-1-1 Program Office minimum standards. Because Operations contracts for reimbursement of these major systems comes from the State E9-1-1 fund, the Program Office reviews each proposed purchase and works within adopted policy guidelines in determining whether to approve each purchase. This of course does not preclude consideration of a new platform that doesn't currently exist.

The notional plan depicted in the map generally has between 2 - 5 remotes serviced by each Hub. Population served in remote areas and the number of 9-1-1 calls received drove the number of remotes connected to each HUB. These numbers are subject to adjustment based on strategic factors as we finalize appropriate solutions.

The committee grouped Hub/Remotes to like 9-1-1 platforms (i.e. Positron/Cassidian/Zetron).

It is important to emphasize that this plan is notional and that full coordination of any plan will be accomplished with all affected parties prior to implementation.

NG 9-1-1 SUBCOMMITTEE
TELEPHONE EQUIPMENT HOSTING PLAN 7/19/11
Washington CPE Equipment Commonality



HUB minimum requirements to qualify

- 6' X 10' of available space is a minimum equipment room requirement to support a hub. This is based on 2- 19" racks (23" outside measurement) and a 3' depth with a minimum of 3' front and back access space.
- A much higher level of HVAC (primarily climate control and cooling) has proven to be necessary for the kind of equipment that a hub will be hosting. This will be factored into the decision.
- On-staff IT support or at least immediately available IT staff will be a plus for consideration of a hub location. If not on-staff, a maximum on site response time will be considered.
- Having the ability for a facility that can support additional on-staff IT between 2 and 4 (yet to be determined) will be a factor.
- IT staff (either on-staff or vendor) will ultimately be trained and certified on all appropriate switches and servers, and Avaya Soft Switch PBXs (this will likely include installations, 9-1-1 and Administrative certifications) recognizing that this will take 1-2 years for all of the training.

- Diverse routes into facility
- This will be an important factor in deciding whether a location can support being a hub.
 - Fiber
 - While this is not absolutely necessary, it will be a factor that will be considered in locating a hub
 - UPS and Generator capability
- Serving multiple remotes as a hub demands survivability.
- The minimum electrical requirements would be 3- 20 amp dedicated circuits.

Next Generation Security:

The borderless nature of IP networks means that security threats affecting the converged infrastructure can arise from anywhere. In a layered architecture, such as that of a Next Generation Network, access is enabled from multiple devices. Therefore, security has to be considered at different points in the architecture. There are three security layers that need to be considered:

- Infrastructure security
- Service security
- Application security.

From a vendor perspective, security resides in various layers, such as, access security, direct or indirect connectivity of networks to Customer Premise Equipment (CPE). Thus, the vendors and public safety entities must adhere to the NENA's NG Security Working Group, NG-SEC standards. The standards identify the basic requirements, procedures and practices to ensure security and affect the entire NG-911 community, public safety answering points, NG-911 ESInet, service providers vendors and contractors.

Additionally, to mitigate security risks, the State 911 Program Office plans to hire a Security Engineer. Although the roles of this position have not been defined, the following are minimum duties that this position will be responsible for:

- Develops, implements and maintains Next Generation 911 Policy, Methods and Procedures for system integrity, availability, and risk management
- Establish IT security audit procedures (Intrusion Detection Vulnerabilities)
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Input and options the committee reviewed:

The options for provision of services and/or remote hosting by vendors were agreed to by committee, TCS, Intrado, Qwest, and Cassidian representatives and included:

1. PSAP owned Hubs/Remotes
2. Commercial Hosting based on current vendor platforms that exist in Washington State.

Based on the fact that Washington State is a Home Rule state, a combination could be considered.

Commonalities among the companies present included:

An ability for their company to individually or by partnering to provide:

- A hosted solution that was NG and NENA compliant and able to meet the i3 standards that were recently adopted.
- Support for both legacy as well as Session Initiated Protocols (SIP).
- Appropriate security in a hosted environment.
- Both Automatic Call Distribution (ACD) and non ACD for different remotes.

The committee was provided with a clarification of terms for a common understanding in referencing the options within the plan

- Traditional 9-1-1 service is the provision of 9-1-1 calls to a single PSAP

- Hosting – is the provision of 9-1-1 service through a central telephone switch or switches to multiple PSAPs from geographically separated vendor locations
- Cloud – is a service delivering calls to the PSAP (no equipment at the vendors location) Three options were considered and researched by the committee and vendor representatives for presentation in early August 2011:

A comparison of the pros and cons of each option can't be done without comparing them to the existing E9-1-1 system. Therefore an assessment of the Current 9-1-1 system has been provided as a base line.

Current 9-1-1 System

Pros:

- All equipment is owned by the PSAP.
- State 9-1-1 reimbursement of costs for Operations Contract counties. Local control of the telephone switch equipment.
- Configuration changes are local controlled.
- Maintenance choices exist that include: On staff IT support that can be equipment certified allowing Tier 1 & 2 support avoiding sometimes lengthy delays, vendor supplied time and materials, or vendor maintenance contracts.
- Where certified on-staff IT staff exist, direct order and improved pricing options exist.

Cons:

- When changes to equipment configurations need to be made vendor costs are high.
- If not on maintenance contracts some vendors don't keep customer informed of version upgrades and/or manufacturer discontinued support leaving the customer vulnerable.
- High cost of initial purchase and immediate need to begin planning for another replacement purchase of hardware and software upgrades.
- PSAPs have seen qualified and experienced vendor maintenance support dwindle leaving them unable to get needed repairs made in a timely manner.

Costs

- Not Applicable, but references to the costs of existing equipment is available from the State E9-1-1 Program Office for final comparison.

Politics

- It has become an acceptable model in this state.
- Economic times are demanding a more economic model.
- Complexity of NG features are exceeding the specialized capabilities of 9-1-1 Coordinators.
- FTEs Maintenance
- For on-staff maintenance the size and volume of the PSAP telephone CAD and Logging Recorder generally requires from .5FTE to 2 FTEs.

Efficiency

- This appears to be one of the least cost effective models, but does operate efficiently because of the local oversight in addition to the process for State review and approval.

Timelines to complete

- Currently in place

PSAP Owned Hubs/Remotes Commercial Hosting

Pros:

- Allows PSAPs that meet minimum Hub requirements and generally have on-staff IT or established good vendor support to provide hub service to remote PSAPs.
- Continues local control over equipment and maintenance.
- Won't need dedicated IT support for back room telephone equipment at remote PSAPs.
- Hub to Hub increases redundancy and diversity for all remotes off of either Hub.
- Allows upgrade to existing equipment rather than replacement at Hubs.
- Reduces equipment at remotes.
- Perceived long term cost savings by reducing number of PSAPs with switches and backroom equipment re: replacing switches and lower cost replacements at remotes.
- State funding is perceived as going farther in this scenario.

Cons:

- Administrative lines are not addressed in this scenario.
- Requires agreement on Concept of Operations and Memo of Understanding or Contract between Hub/s and Remotes.
- Requires universal control over system by Hubs.
- Unable/unwilling to maintain different versions in cloud computing.
- Will bring some networking headaches.
- Requires at least 2 Hubs that are duplicated with all remotes for redundancy and diversity.
- Existing equipment at remotes with useful life may need to be surplus.
- Additional training and certification of on-staff IT for support of multiple PSAPs on Hub switch.
- Additional liabilities assumed by Hub counties.

Costs

- Implementation costs for Hubs to upgrade switches and servers to handle the traffic and volumes for multiple PSAPs.
- Training costs for certification of IT staff if it doesn't already exist today.
- Programming costs of configuration of switches and servers will be needed prior to implementation.

Politics

- Possible perception of loss of local control in remote counties.
- This may be offset by off-loading of back room equipment and responsibilities.
- Simplifies remote county's equipment needs and maintenance needs.
- The effect on Operations Contracts as responsibility, maintenance, and complexity are reduced, may not be popular as support costs are reduced.
- The above may be offset as a new paradigm emerges in the form of revised and an increased level of statewide services is considered.

Maintenance

- Hub maintenance that can be vendor supplied where competency and experience is proven.
- Where certified on-staff IT support for Tier 1 & 2 can be provided for Hubs, it will require the ability for 24 X 7 on call capabilities as support for hub and remote counties switch support results.
- The number of FTEs will need to be determined on a case by case basis.

Efficiency

- This will produce a higher level of efficiency based on a single source (Hub).
- Rather than replacing switch and server equipment at every PSAP, remotes become limited to only workstations (CPU, monitor keyboard, mouse) and gateways and servers in the back room.
- Only Hubs have full switches in the back rooms that are costly to repair and they are limited in numbers.

Timelines to complete

- Generally, from working with the vendors involved in the M-1 Cassidian Platform it appears that a single Hub to Hub redundancy scenario could be completed within a 12 month period. While adding remotes to each Hub has been discussed, it is not yet clear what timeline would be necessary.

Telecommunications Company Hosting (turnkey based on current platforms being maintained)

The committee is scheduled to meet in early August with vendor representatives present to work on costs as well as providing information for this option

Pros:

Cons:

Costs

Politics

FTEs Maintenance

Efficiency

Timelines to complete

Phase 3 Steps to get to full i3 NG9-1-1

Phase 3 (Progress directly limited by annual revenue) – Consolidation of Equipment and Implementation of i3 capability at all PSAPs includes the final modernization phase which results in full digital-to-digital voice and data from start to finish. It is also the most time consuming and expensive phase of the modernization that must be categorized as a new implementation phase.

Step 1 - Includes the in-depth evaluation of the options currently available and tested, that can address centralization and/or hosting of equipment. We must predict up-front costs and long term cost savings for each option. There are currently three known options for evaluation and there may be multiple provider solutions. We must evaluate those options, to be able to determine with relative accuracy the costs and timelines for implementation.

- A. PSAP owned equipment and sharing of hosted equipment between multiple PSAPs;
- B. Commercially hosted centralization of equipment; or,
- C. Combination of both

Step 2 - The State E9-1-1 Program Office must publish minimum 9-1-1 system and equipment requirements to be Next Generation 9-1-1 compliant, and approve in advance each PSAP's equipment proposals for reimbursement eligibility on a case by case basis. This must be done in a vendor neutral environment. In addition standards for service delivery within Washington State must be established as our state moves forward with an NG9-1-1 solution.

Step 3 - Before PSAPs can receive new types of data that will arrive with a 9-1-1 call, all PSAP equipment, including E9-1-1 call-taking equipment, Computer-Aided Dispatch (CAD), mapping and logging recorder equipment will be evaluated to determine if the systems need to be upgraded or replaced to ensure these new data types can be appropriately processed and archived. Vendor products must meet the recently adopted i3 standard for processing data universally. 9-1-1 officials in each county must decide what data will be valuable and accessible to Call Receivers, and what should only be accessible to public safety responders. This equates to directing data to appropriate servers that can either be accessed by call receivers and mobile computers in the field, or be limited. This is extremely important to prevent an overload of information processed by call receivers.

The option selected in Step 1 will then need to include an evaluation and cost estimates completed for each PSAP of the following:

- A. The cost and the effectiveness of the chosen solution to include both implementation and long term effects.
- B. An upgrade or replacement of 9-1-1 telephone equipment (hardware or software) needed to establish Session Initiated Protocol (SIP) capability.

- C. An upgrade to the Computer Aided Dispatch (CAD) systems needed to accept or access IP forms of data.
- D. An upgrade or replacement of logging recorder systems to accept digital voice and IP data associated with full i3 Next Generation 9-1-1 in accordance with national 9-1-1 standards needed.

Step 4 – It goes without saying that our call receivers will need training to ensure their understanding of each of the additional forms of data and can process it appropriately and consistently. Each county will need to decide what data will be presented or available for presentation to the call receiver and what will be auto-directed to a server/s in the form of a premise file that can be accessed by public safety responders. Law enforcement and fire service input will be need to be considered in determining whether data is presented directly to mobile computers or whether a premise flag or indication that data is available so they can access it when and if they need to.

Step 5 - The migration of the E 9-1-1 system through the next phase of the modernization requires keeping portions of the existing system in place during that migration. This will provide E9-1-1 statewide while the system is being updated. It will also allow time for commercial communications companies including wireline, wireless and VoIP carriers to upgrade their equipment to full IP digital-to-digital processing of voice and data which is required to complete this essential link to NG9-1-1 technologies.

A State and local 9-1-1 excise tax rate increase was approved by the Washington State Legislature and signed by Governor Gregoire in 2010 to provide funding for the modernization of the statewide E9-1-1 system. The excise tax increase took effective January 1, 2011.

9-1-1 authorities must ensure that every Washington resident and visitor is able to access 9-1-1 utilizing multimedia sources to receive the highest quality and most economical 9-1-1 service. Our legislators, the Governor, commercial voice and data service providers and public safety agencies must continue to work together to ensure we continue our progress toward the modernization of our E9-1-1 system that serves the emergent needs of all citizens within Washington State.

Projected Completion Timeline to full i3 NG9-1-1

This will be directly dependent on expenditures within available revenue during each biennium from the State E9-1-1 fund and annually from each of the County 9-1-1 funds. Based on projections, as of this report date, equipment consolidation and equipment upgrades and/or replacements will begin in 2011 and is projected to be completed for all counties in 2017.

