

Staff Subcommittee on Telecommunications



Next Generation 9-1-1 and Reliability- Challenges and Opportunities



First, a short primer:
What is NG9-1-1?

The Legacy Foundation of 9-1-1 Technology

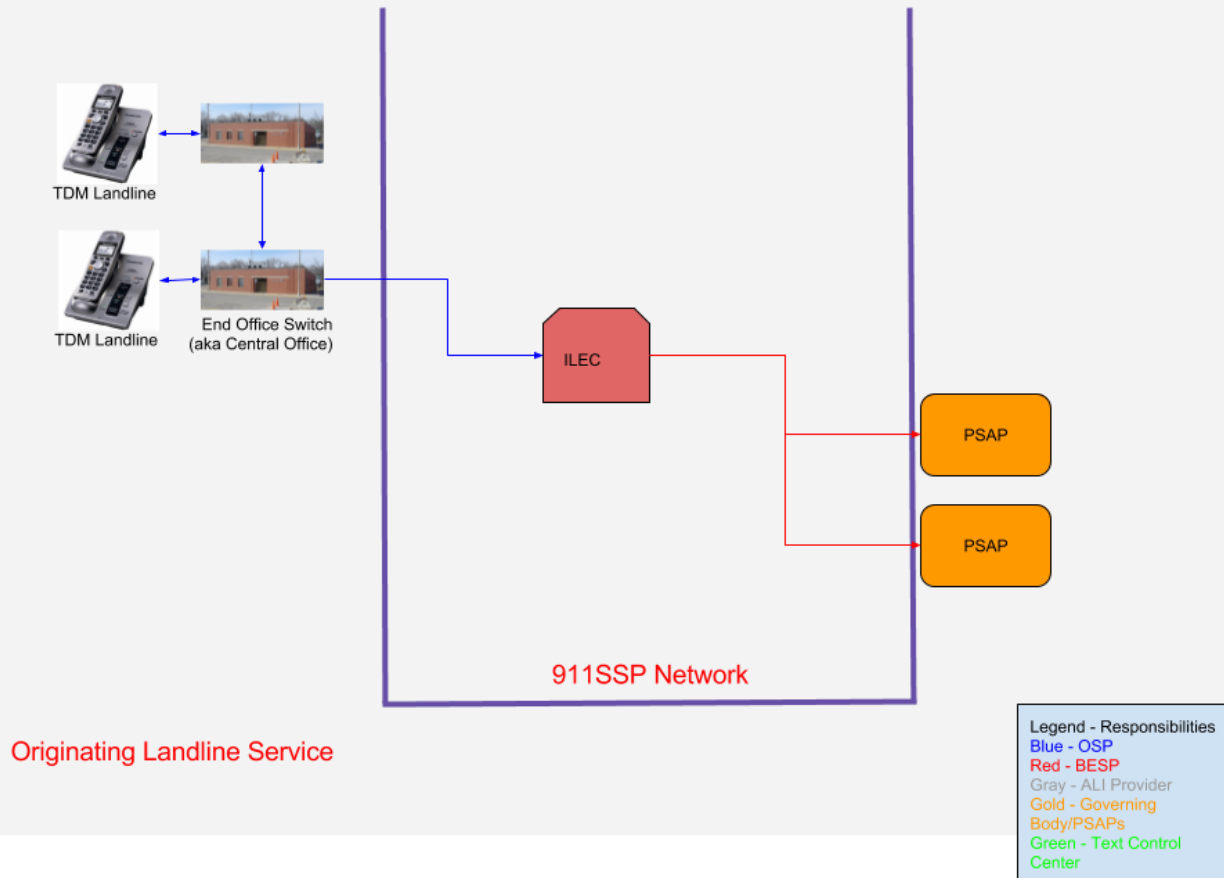
The first 9-1-1 call was placed in 1968. 9-1-1 at that time did not provide caller location, name, or even call back number. Cell phones, VoIP, and texting didn't exist, yet.

Every evolution that has occurred in 9-1-1 technology since then has been a new structure or workaround build on this original foundation.



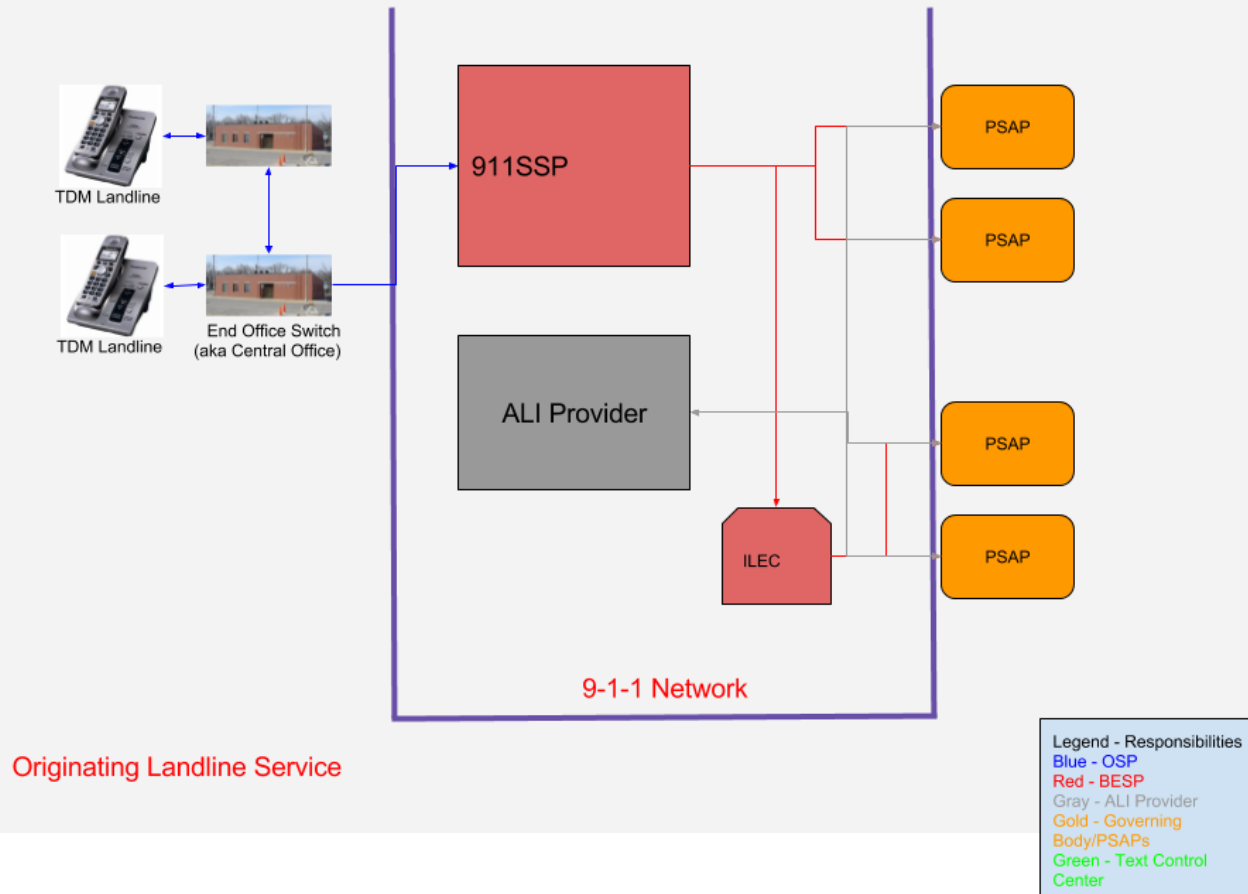
Basic 9-1-1

Basic, Landline, Legacy 9-1-1 Call Flow



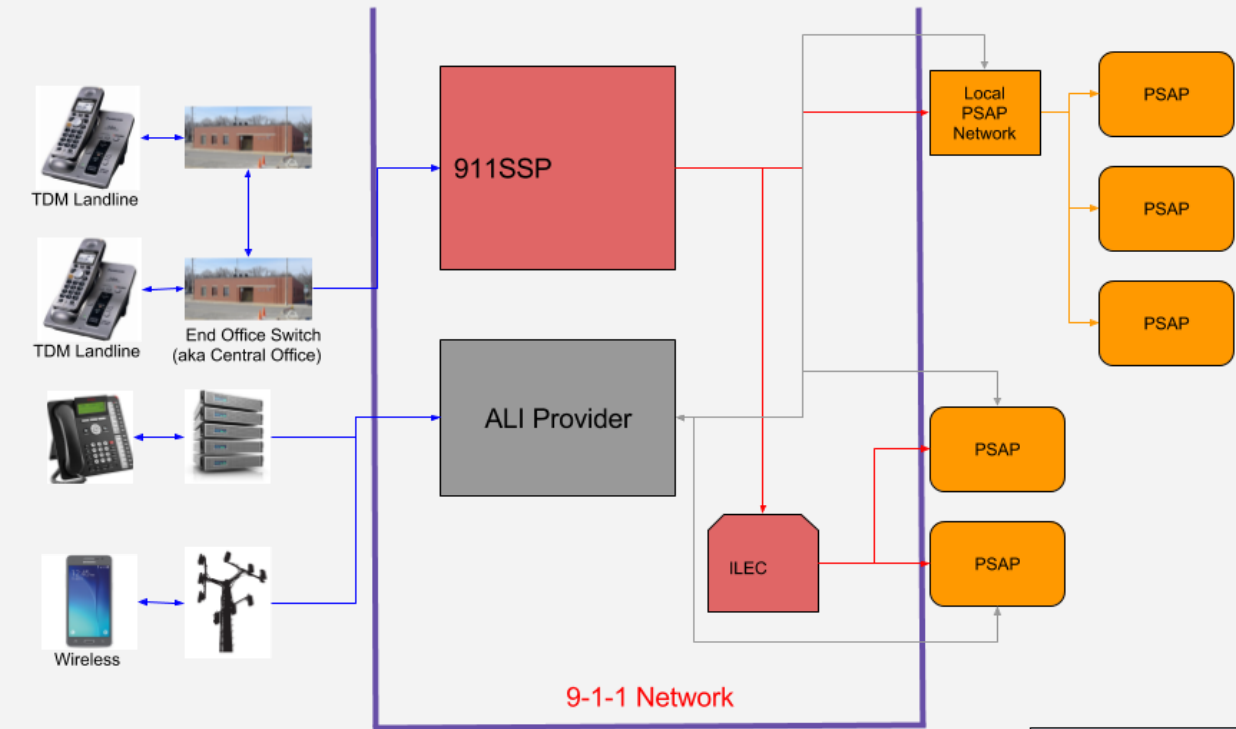
Enhanced 9-1-1

Basic, Landline, Legacy 9-1-1 Call Flow



Wireless and VoIP 9-1-1

Wireless Legacy and VoIP 9-1-1 Call Flow

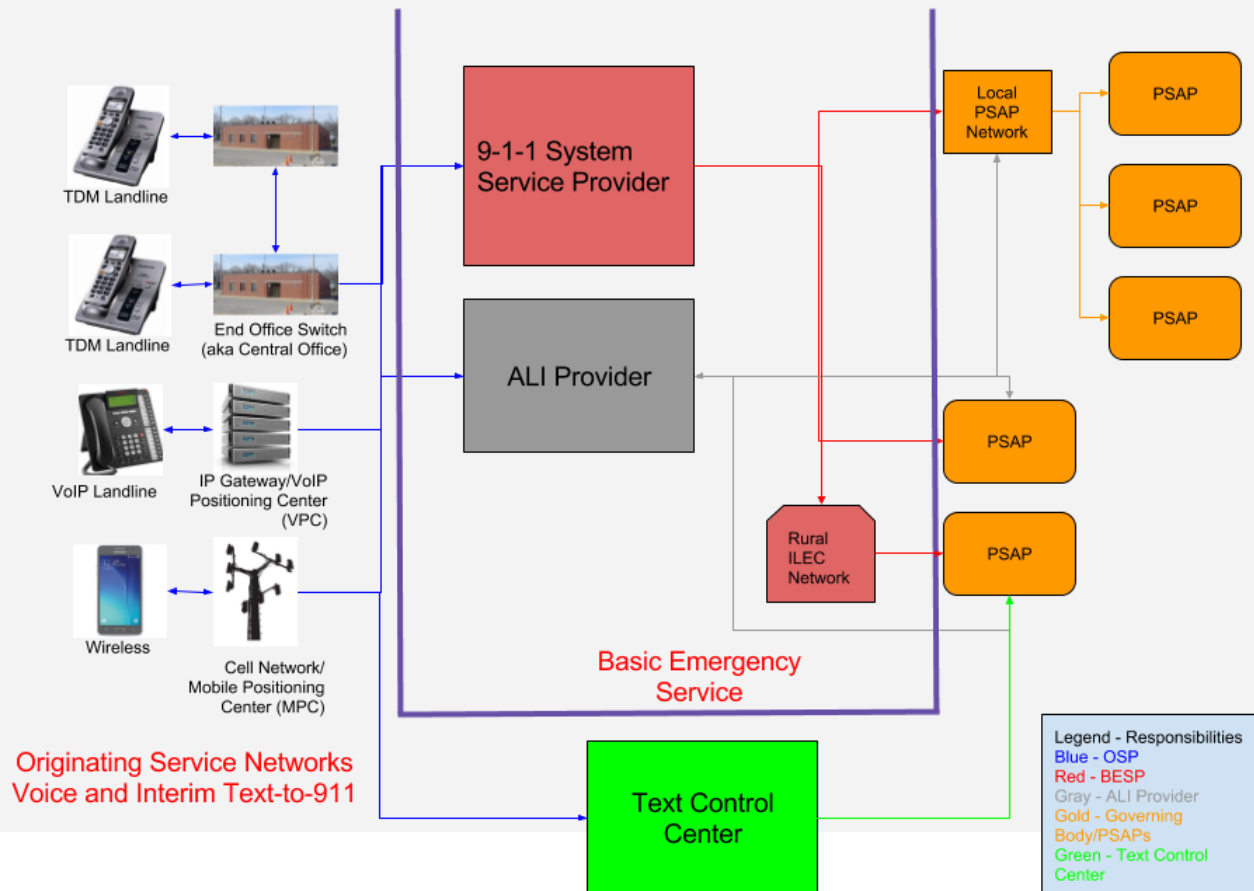


Originating Landline and
Wireless Service

Legend - Responsibilities
Blue - OSP
Red - BESEP
Gray - ALI Provider
Gold - Governing
Body/PSAPs
Green - Text Control
Center

Text-to-911

9-1-1 Call Flow Under Legacy (Enhanced) 9-1-1 Network

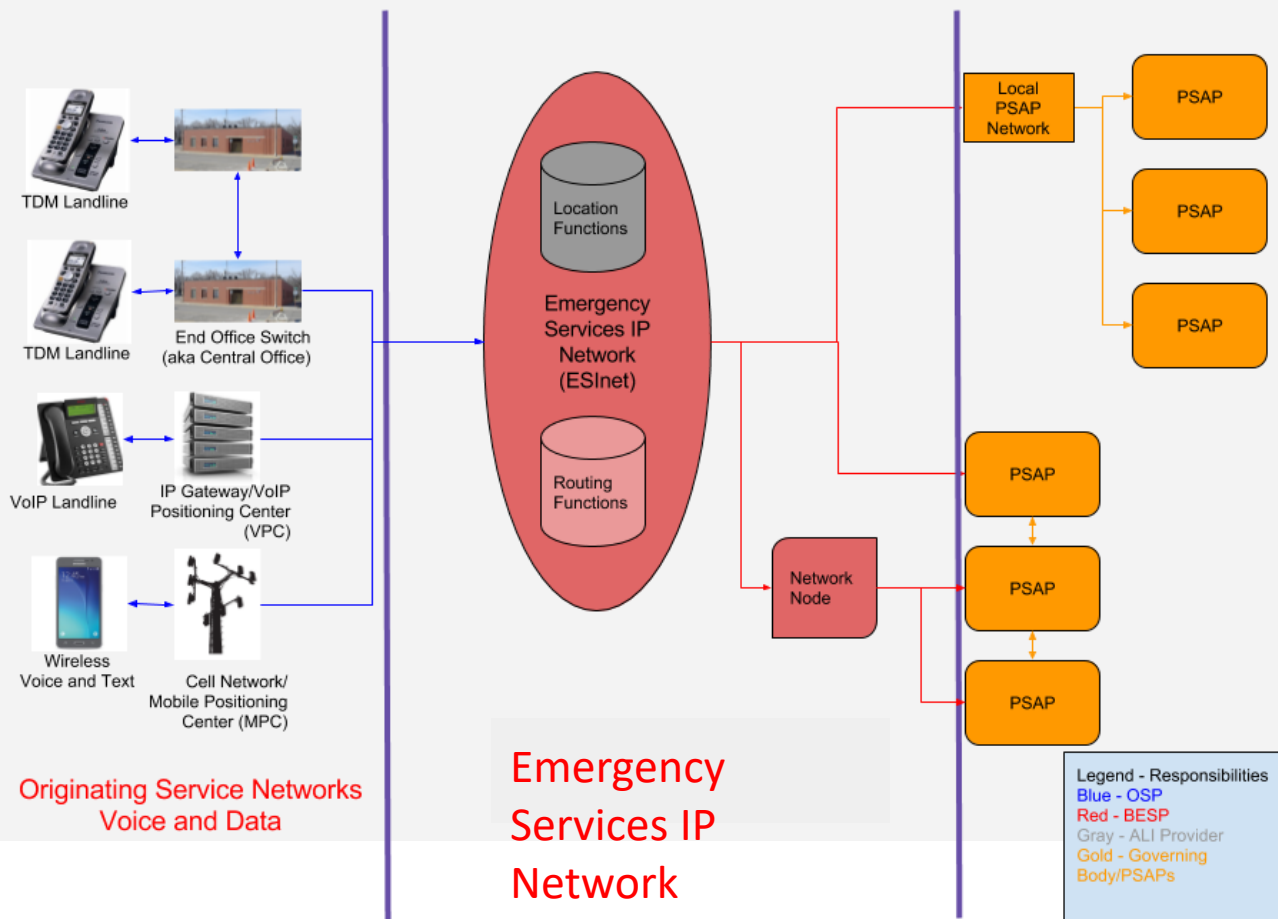


Limits of the Foundation

- The system is overly complex because of the many layers that have been added.
 - Enhanced 9-1-1
 - Wireless Enhanced 9-1-1
 - Voice over Internet Protocol and some ACN
 - Text-to-911
- System still can't accept:
 - Automatic Crash Notification Data
 - Pictures and video
 - Building schematics
 - Medical info
 - Other data

The Solution - Pour a New Foundation

9-1-1 Call Flow In a Next Generation 9-1-1 Network



What Is the Status of NG9-1-1?

- Several states have already implemented the foundation for NG9-1-1, even though not all of the functionality of NG9-1-1 is yet available.
- Many other states are still trying to decide how to govern and fund NG9-1-1.
- Federal funding may be available soon to assist states in creating this new foundation for 9-1-1 service.

Moderator: Daryl Branson

Daryl Branson is a Senior 911 Telecom Analyst with the Colorado Utilities Commission, part of the Colorado Department of Regulation



Agencies. Daryl has previously been a 9-1-1 dispatcher and call taker in Missouri, a 9-1-1 call center shift supervisor in Wisconsin, and a 9-1-1 call center director in New Mexico. Previous to his employment with the Commission, Daryl served as the Executive Director of the Colorado 9-1-1 Resource Center, a 501(c)3 nonprofit organization providing support to the local 9-1-1 governing bodies of the state of Colorado. He currently serves as the Secretary of the Colorado Chapter of NENA/APCO, a member of the national Next Generation 9-1-1 Institute Board, and recently served as a member of the Federal Communications Commission's Task Force on Optimal PSAP Architecture, representing NASNA.

He holds a Master of Public Administration degree from Missouri State University and is certified both as an Emergency Number Professional by the National Emergency Number Association and a Registered Public Safety Communications Leader by the Association of Public Safety Communications Officials.

Panelists: Mary Boyd Mary Boyd is Vice President of Regulatory Policy and External Affairs at West Safety Services and has over 30 years of Public Safety experience. She previously served as a 9-1-1 manager for the City of Austin and



Houston, and as Executive Director of the Texas Commission on State Emergency Communications. Recently, Mary served as Work Group Chair Group Chair with CSRIC VI for NG911 and Reliability recommendations; and prior to that she was an active member of the FCC Task Force On Optimal PSAP Architecture (TFOPA).

She serves on many national forums, has co-authored publications, is a frequent speaker at public safety association events and has been recognized nationally for her accomplishments. She is a former President of the National Emergency Number Association (NENA) and the National Association of State 9-1-1 Administrators and serves of Chair of the NG9-1-1 Institute Board of Directors.

Ms. Boyd has also served in international capacities promoting the development of emergency response systems and has been a participant with the European Emergency Number Association (EENA).

She also holds an undergraduate degree from St. Edwards University, and advanced studies at Northwestern University, Kellogg School of Management.

Panelists: Walt Magnussen

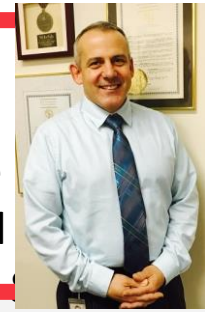


Dr. Walt Magnussen Directs the Internet2 Technology Evaluation Center (ITEC) at Texas A&M University. The ITEC has been heavily involved with NG9-1-1 since 2005 when it was funded to develop the first NG9-1-1 system under the US DoT proof of concept project. It is also hosting the Harris County FirstNet core. Harris County, Texas, was funded to be the first early adopter of FirstNet.

Walt also has an appointment to the United States Department of Justice, National Institute of Justice (DoJ NIJ). Recently he was also appointed to the FCC's sixth Communications Security Reliability and Interoperability Council (CSRIC VI).

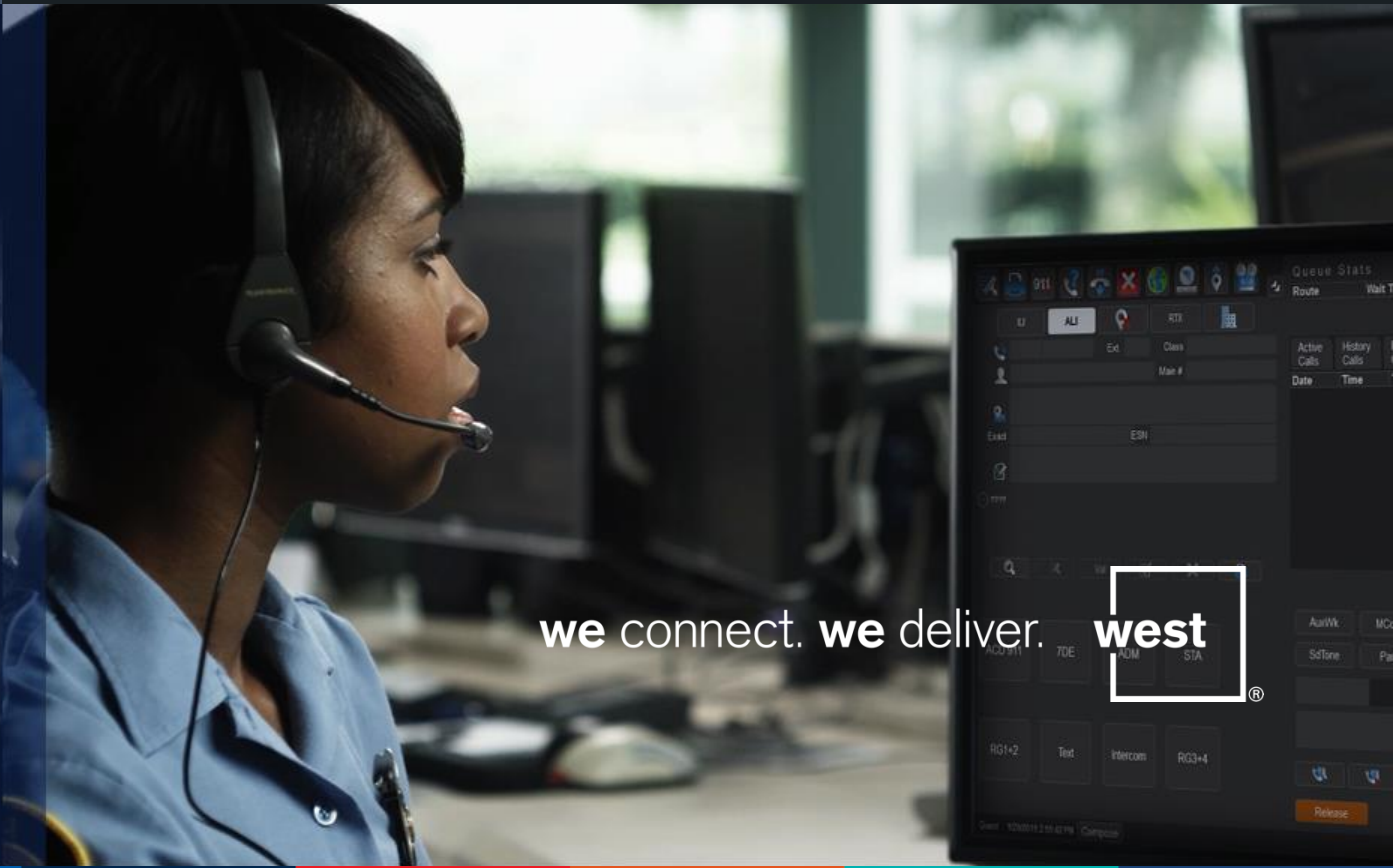
Panelists: Budge Carrier

Since 2011 Budge has been with the California Governor's Office Emergency Services (CalOES). During that time Budge has served Engineer as well as numerous other strategic planning positions.

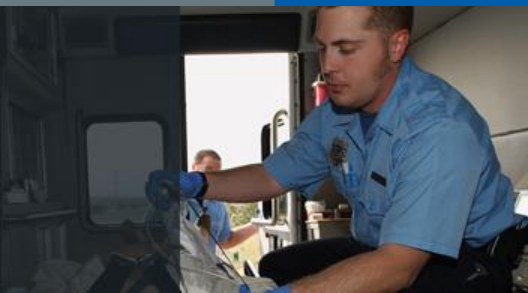


Budge served as the Statewide Interoperability Coordinator (SWIC) for California and he has led the California Emergency Function 2 (EF-2 – Communications). As the SWIC and EF-2, he developed procedures for several statewide catastrophic plans and was instrumental in the Super Bowl 2016 interoperable communication planning. Since 2016, Budge has served as the 9-1-1 Emergency Communications Branch Manager for California and is responsible for the 9-1-1 Network that supports 441 PSAPs with an annual call volume of 28.5 million 9-1-1 calls. Since 2017 Budge has been the lead program manager for the Opt-In/Out-Out process for FirstNet in California. Prior to coming to CalOES, Budge assisted many counties and states with developing public safety communication systems and planning for interoperable communications. Budge also has over 20 years of communication experience while serving as a Communications Officer in the Marine Corps.

Budge holds a BS Degree in Computer Science from University of Michigan and a Master's Degree in Electrical Engineering from the Naval Postgraduate School in Monterey.



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NG9-1-1 RELIABILITY:

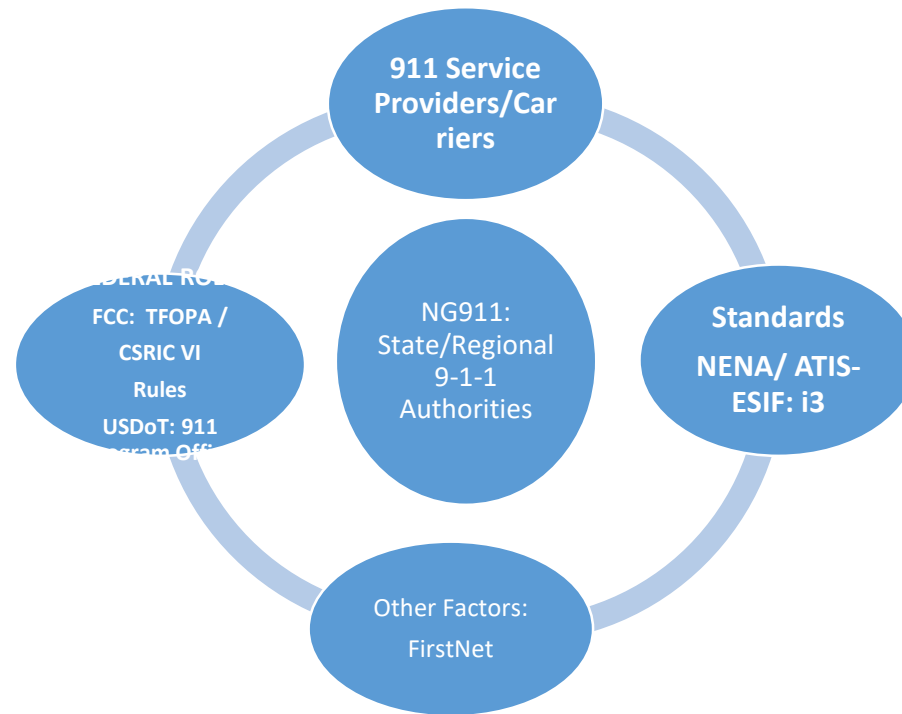
CHALLENGES & OPPORTUNITIES

Mary A. Boyd, ENP

VP, Government Regulatory Policy

West Safety Services

MIGRATING TO NG9-1-1: THE PLAYERS



9-1-1 RELIABILITY: FCC / CSRIC BEST PRACTICES

Network reliability council (NRC)

- Established in 1992, after a major nationwide outage, the FCC chartered the council “to provide recommendations both for the FCC and for the telecommunications industry that, when implemented, will help prevent public telephone network outages from occurring.
- E9-1-1: “A review of 123 outages in 1991-1992 revealed that over half of the disruptions were caused by a failure of the interoffice facility transporting the 9-1-1 call”... “defer plans to use SS7 for 9-1-1 until unique feature requirements are addressed by standards bodies” “improve communications among stakeholders..... “use FCC outage reports as the metric for national 911 reliability improvements”

Communications reliability & interoperability council (csric)

- The NRC was re-chartered over time as CSRIC and remains an active part of the FCC today with a mission is to provide recommendations to the Commission to ensure, among other things, optimal security and reliability of communications systems, including telecommunications, media, and public safety.
- CSRIC VI was convened in June 2017 with three workgroups focused on NG911; Emergency Alerting and Network Security Risk Reduction.

FCC: CSRIC VI – Work

- *Task 1 – 911 System Reliability and Resiliency during the NG911 Transition:*

- Review existing best practices and develop additional guidance regarding overall monitoring, reliability, notifications, and accountability in preventing 911 outages in transitional NG911 environments (1022 Best Practices; 794 related to Service Providers; 182 related to Public Safety)

- Identify risks associated with transitional 911 systems that could result in disruptions to 911 service and make recommendations to protect them, including recommendations for best practices and standards development.
- Study specific actions that originating service providers, 911 system service providers and other entities in the 911 call chain should take to detect and deter outage precursors before 911 calls are delivered to the ESInet gateway.

- *Task 2 - Small Carrier NG911 Transition Considerations:*

- Study and develop recommendations on **small carrier best practices for managing the transition to NG911**. This would include advice on:
 - What small carriers operating within a state region **need to do to be ready on time to deliver their 911 traffic** in an NG911-compatible manner;
 - **What economic disadvantages**, if any, may impede small carriers in implementation of NG911; and
 - **What barriers to implementation**, if any, the FCC should address.
- The FCC directs CSRIC to recommend a “**NG911 readiness checklist**” for small carriers analogous to the one TFOPA developed for PSAPs.

9-1-1 RELIABILITY: FCC PART 12 RULES

- **PURPOSE:**
- **The rules in this part include requirements that will help ensure the resiliency, redundancy and reliability of communications systems, particularly 911 and E911 networks and/or systems.**
- **Entities must analyze their 911 and E911 networks and/or systems and provide a detailed report to the Commission on the redundancy, resiliency, and reliability of those networks and/or systems.**
- (a) The PSHSB has the delegated authority to implement and activate a process through which these reports will be submitted, including the authority to establish the specific data that will be required....., **these reports should include descriptions of the steps the service providers intend to take to ensure diversity and dependability** in their 911 and E911 networks and/or systems, including any plans they have to migrate those networks and/or systems to a next generation Internet Protocol-based E911 platform.
- (b) **These reports are due 120 days from the date that the Commission....ANNUAL CERTIFICATION DUE OCT. 15TH**
- (c) **Reports filed under this Part will be presumed to be confidential.**

9-1-1 RELIABILITY: FCC PART 12 RULES

- *Covered 911 service provider.*
- (i) Any entity that:
 - (A) **Provides 911, E911, or NG911 capabilities such as call routing, automatic location information (ALI), automatic number identification (ANI), or the functional equivalent of those capabilities, directly to a public safety answering point (PSAP), statewide default answering point, or appropriate local emergency authority as defined in §§64.3000(b) and 20.3 of this chapter; and/or**
 - (B) **Operates one or more central offices that directly serve a PSAP. For purposes of this section, a central office directly serves a PSAP if it hosts a selective router or ALI/ANI database, provides equivalent NG911 capabilities, or is the last service-provider facility through which a 911 trunk or administrative line passes before connecting to a PSAP.**
- (ii) The term “covered 911 service provider” **shall not include any entity that:**
 - (A) Constitutes a **PSAP or governmental authority** to the extent that it provides 911 capabilities; or
 - (B) Offers the capability to originate 911 calls where another service provider delivers those calls and associated number or location information to the appropriate PSAP.

9-1-1 RELIABILITY:

FCC PART 12 RULES (Cont'd)

- ***Provision of reliable 911 service.*** All covered 911 service providers shall take reasonable measures to provide reliable 911 service with respect to circuit diversity, central-office backup power, and diverse network monitoring. Performance of the elements of the certification set forth in paragraphs (c)(1)(i), (c)(2)(i), and (c)(3)(i) of this section shall be deemed to satisfy the requirements of this paragraph. If a covered 911 service provider cannot certify that it has performed a given element, the Commission may determine that such provider nevertheless satisfies the requirements of this paragraph based upon a showing in accordance with paragraph (c) of this section that it is taking alternative measures with respect to that element that are reasonably sufficient to mitigate the risk of failure, or that one or more certification elements are not applicable to its network.
- ***Annual reliability certification.*** One year after the initial reliability certification described in paragraph (d)(1) of this section and every year thereafter, a certifying official of every covered 911 service provider shall submit a certification to the Commission as follows:.
- (1) ***Circuit auditing.*** (i) A covered 911 service provider shall certify whether it has, within the past year:
 - (A) Conducted diversity audits of critical 911 circuits or equivalent data paths to any PSAP served;
 - (B) Tagged such critical 911 circuits to reduce the probability of inadvertent loss of diversity in the period between audits; and
 - (C) Eliminated all single points of failure in critical 911 circuits or equivalent data paths serving each PSAP.

9-1-1 RELIABILITY:

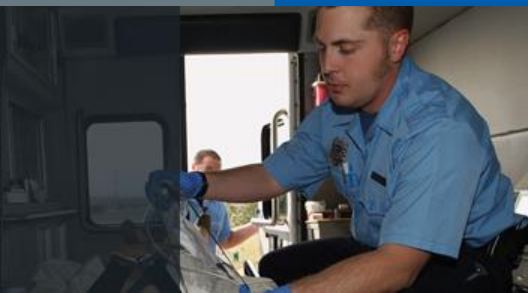
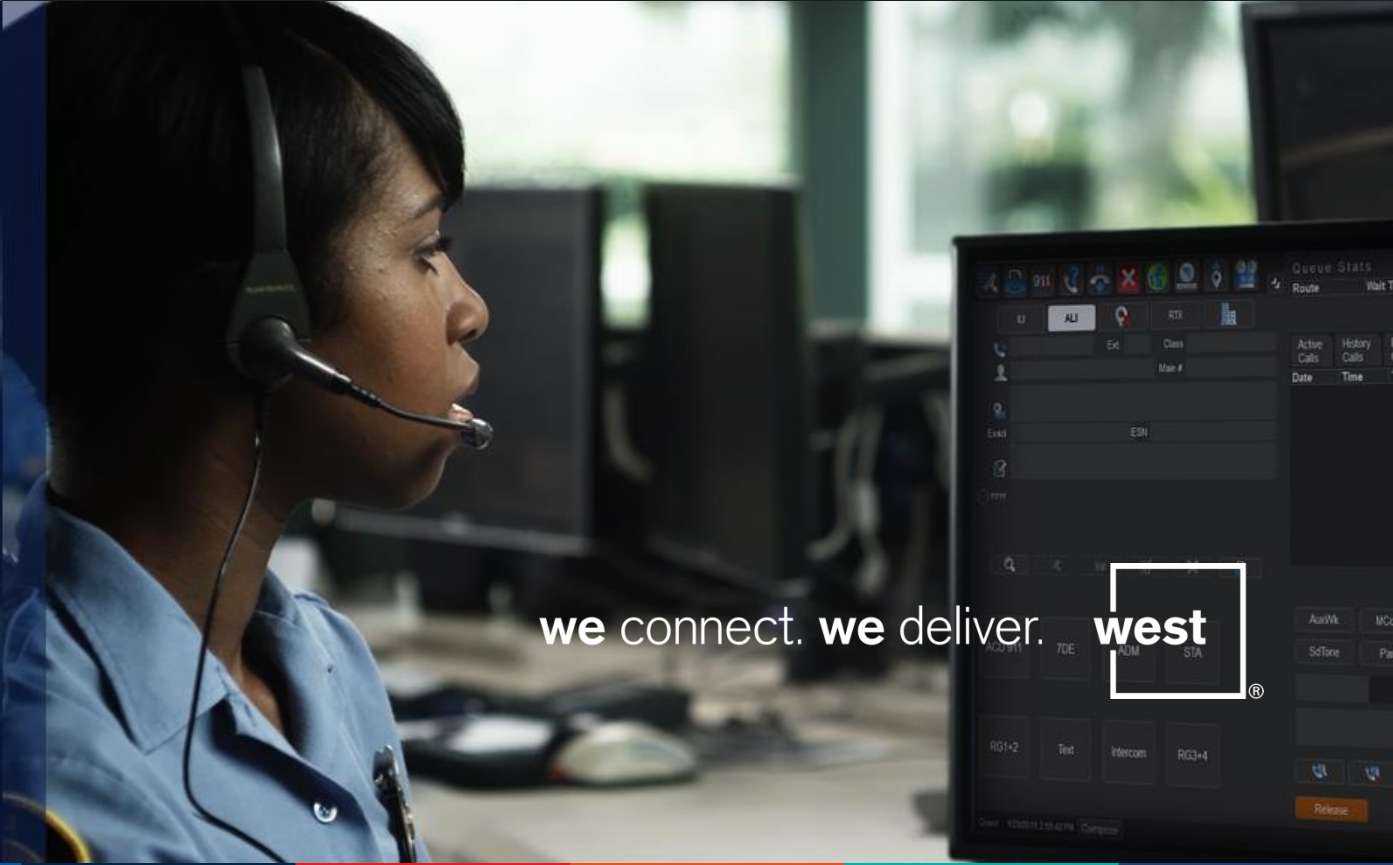
FCC PART 12 RULES (Cont'd)

- If a Covered 911 Service Provider does not conform with all of the elements in paragraph (c)(1)(i), with respect to the 911 service provided to one or more PSAPs, **it must certify with respect to each such PSAP:**
 - Whether it has taken alternative measures to mitigate the risk of critical 911 circuits that are not physically diverse or is taking steps to remediate any issues that it has identified with respect to 911 service to the PSAP.....
- (2) **Backup power.** (i) With respect to any central office it operates that directly serves a PSAP, a covered 911 service provider shall certify whether it:
 - (A) Provisions backup power through fixed generators, portable generators, batteries, fuel cells, or a combination of these or other such sources to maintain full-service functionality, including network monitoring capabilities, for at least 24 hours at full office load or, if the central office hosts a selective router, at least 72 hours at full office load; provided, however, that any such portable generators shall be readily available within the time it takes the batteries to drain, notwithstanding potential demand for such generators elsewhere in the service provider's network.
 - (B) Tests and maintains all backup power equipment....

9-1-1 RELIABILITY:

FCC PART 12 RULES (Cont'd)

- ***Network monitoring.*** A covered 911 service provider shall certify whether it has, within the past year:
 - (A) Conducted diversity audits of the aggregation points that it uses to gather network monitoring data in each 911 service area;
 - (B) Conducted diversity audits of monitoring links between aggregation points and NOCs for each 911 service area in which it operates; and
 - (C) Implemented physically diverse aggregation points for network monitoring data in each 911 service area and physically diverse monitoring links from such aggregation points to at least one NOC.



Thank You -
Mary.Boyd @West.Com

NG 9-1-1 Regulatory issues
NARUC Summer Policy Summit
16 July, 2017
San Diego, Calif

Dr. Walt Magnussen

Director TAMU ITEC

Public Safety Advocate US UCAN

The Mission of the ITEC

- Interoperability Testing – Operationalizing what we do know.
- Public Safety Communications Research – Learning what we don't know.
- Outreach – Sharing what we know, building grass root support
- These are accomplished through Publications, Exercises and Experiments.

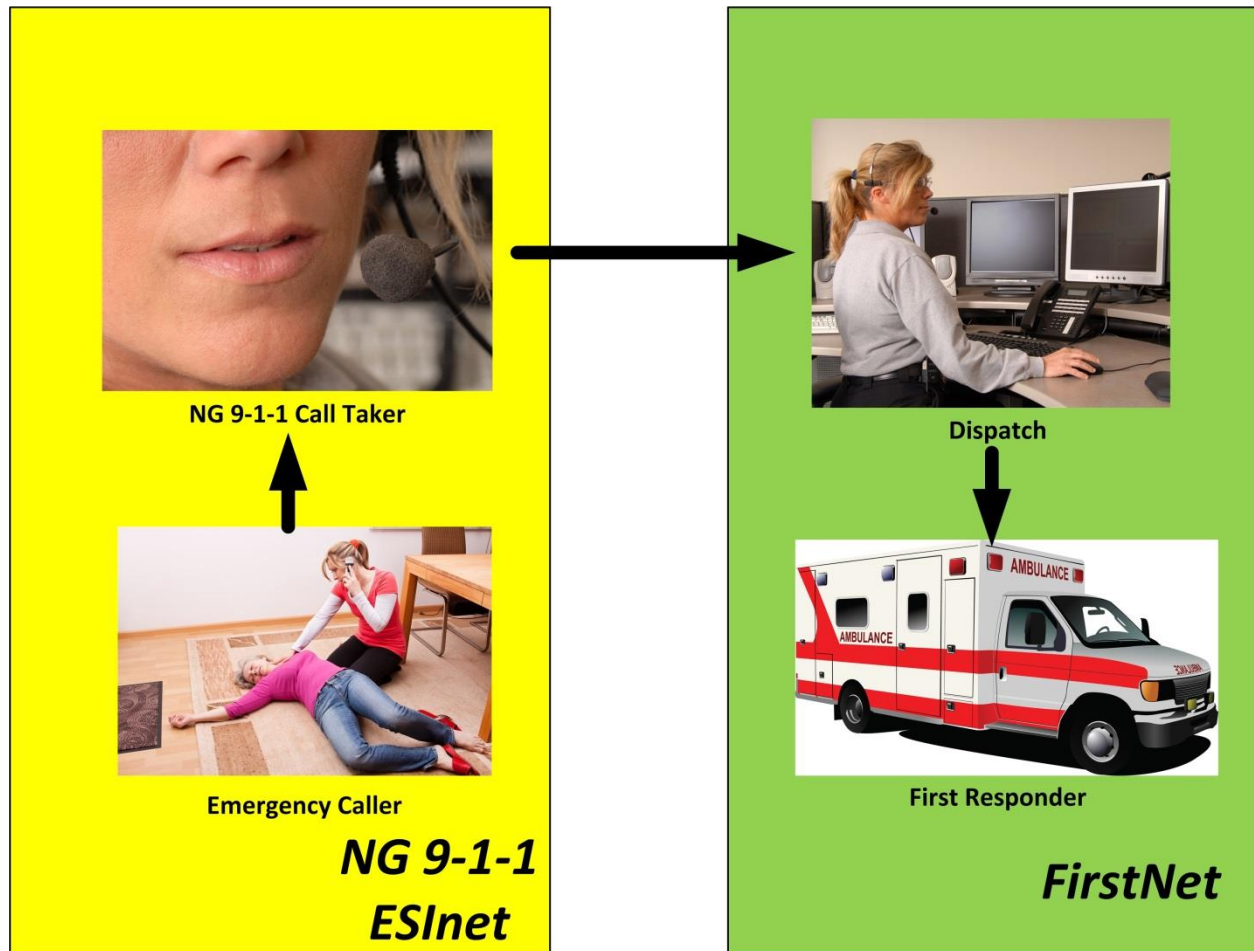
Major ITEC Research Initiatives Sponsors and Partners

- NG 9-1-1 Testbed – Texas CSEC
- Firstnet Support – Harris County
- Application support for PSCR
- CAUSE IV – DHS S&T, DR-DC and Parallel Wireless
- Satellite support for Broadband – Texas National Guard
- Network Prioritization DHS OEC
- IMS Interoperability – Mitel
- Winter Institute – General Dynamics

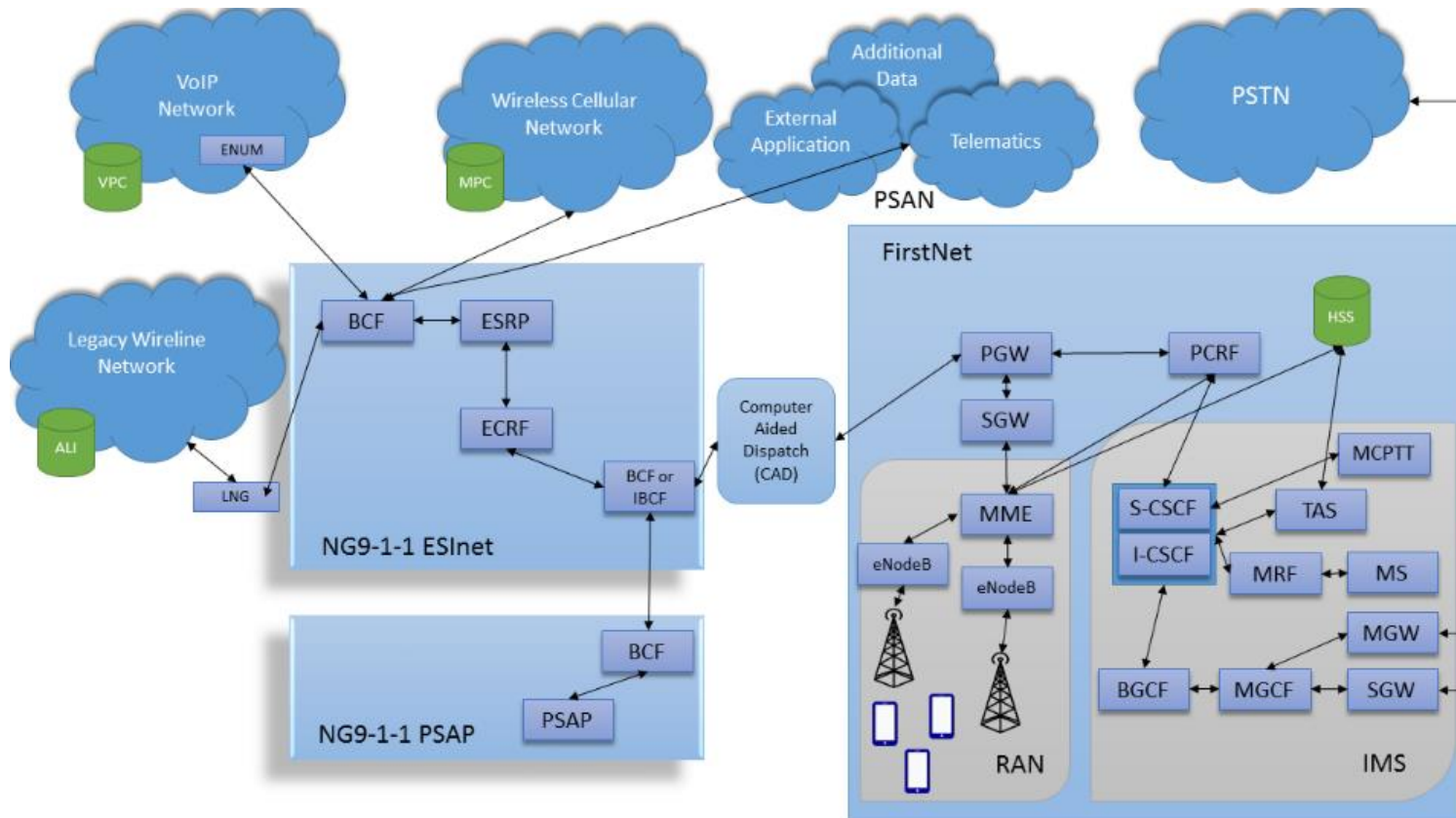
Most Significant NG 9-1-1 issues

- Funding
- Top Level ESInet (State Interconnection)
- More comprehensive security plan (EC3)
- Interconnection with FirstNet
- End of life of e911 legacy functions

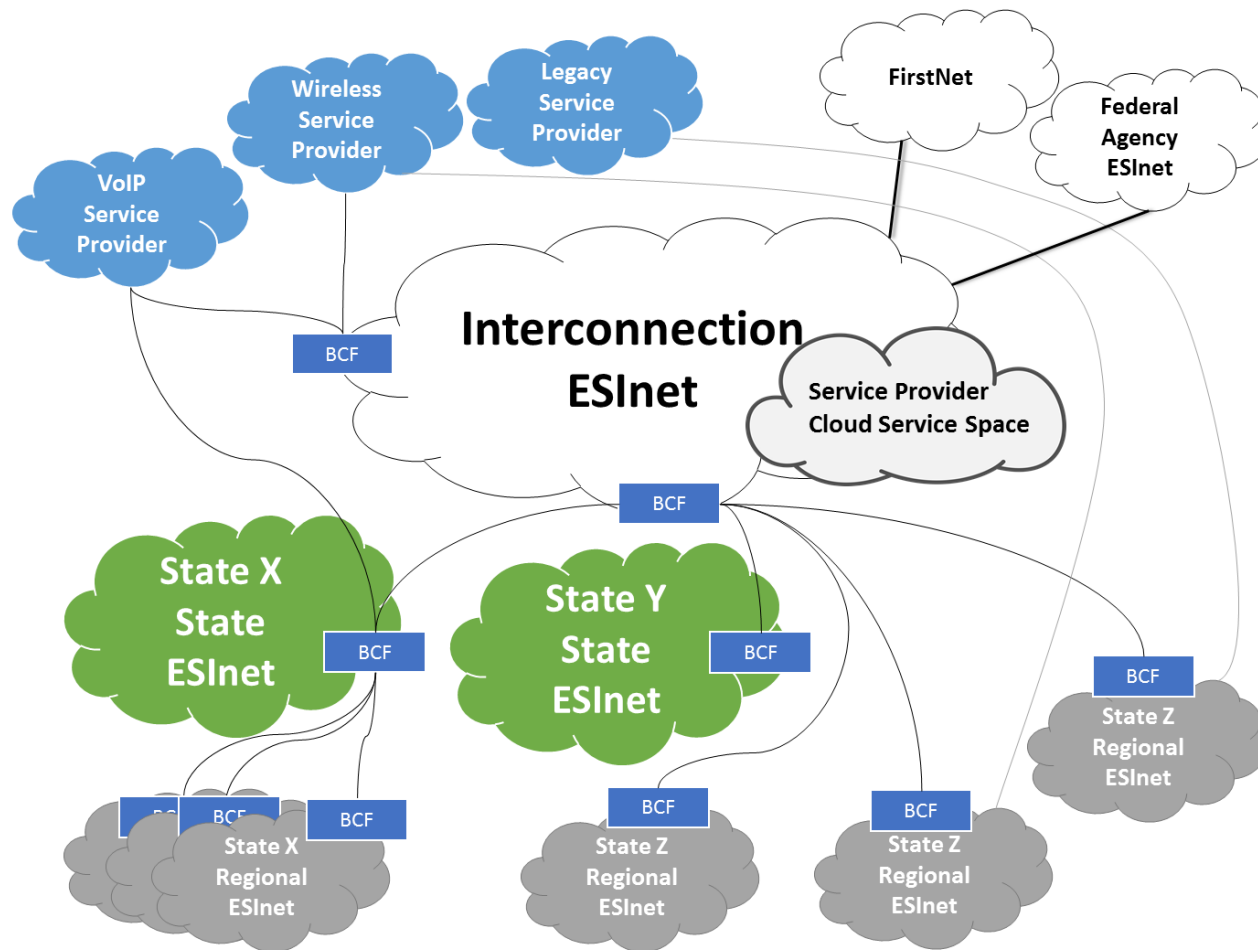
ITEC Vision



APCO Project 43



Nation Wide ESInet





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Next Gen 9-1-1 – State Perspective

July, 2017

California 9-1-1 Emergency Communications Branch

Purposes

- California's Next Gen 9-1-1 Perspective
- Overview of California 9-1-1 System
- Overview of Next Gen 9-1-1 Transition
- Role of Cal OES
- Role of PSAP
- Next Steps

9-1-1 in California Today

2016 California 9-1-1 Call Statistics

Total 9-1-1 Calls: 28,507,534

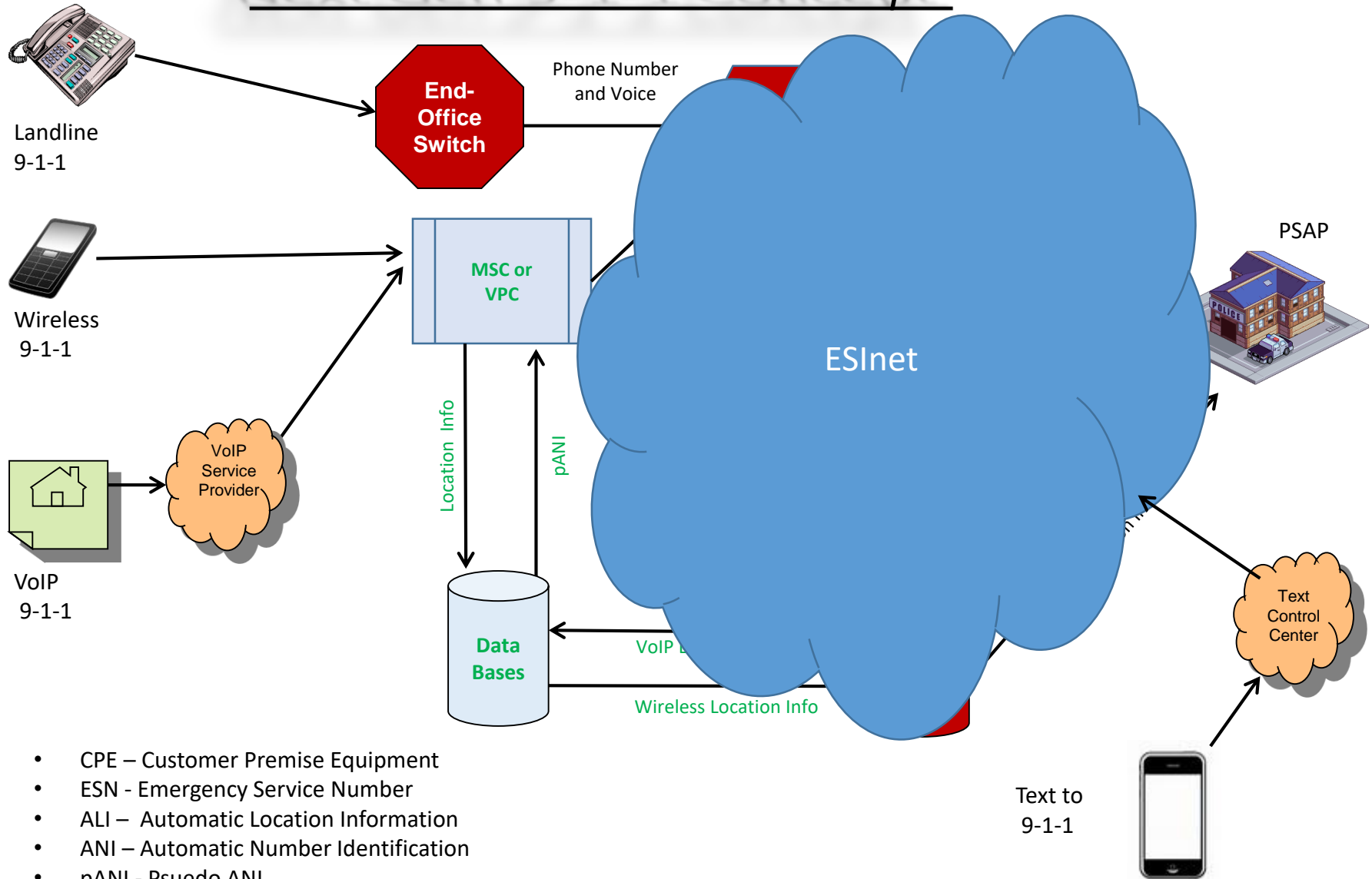
- 80% Wireless
- 16% Wireline
- 3% Voice over IP
- 1% Other to include Telematics
- ~ 5k Text Messages

Current 9-1-1 System

- Based on 1970's technology
- Supports voice and limited data
- Infrastructure beyond end of life
- Does not meet needs of current technology



Next Gen 9-1-1 Concept

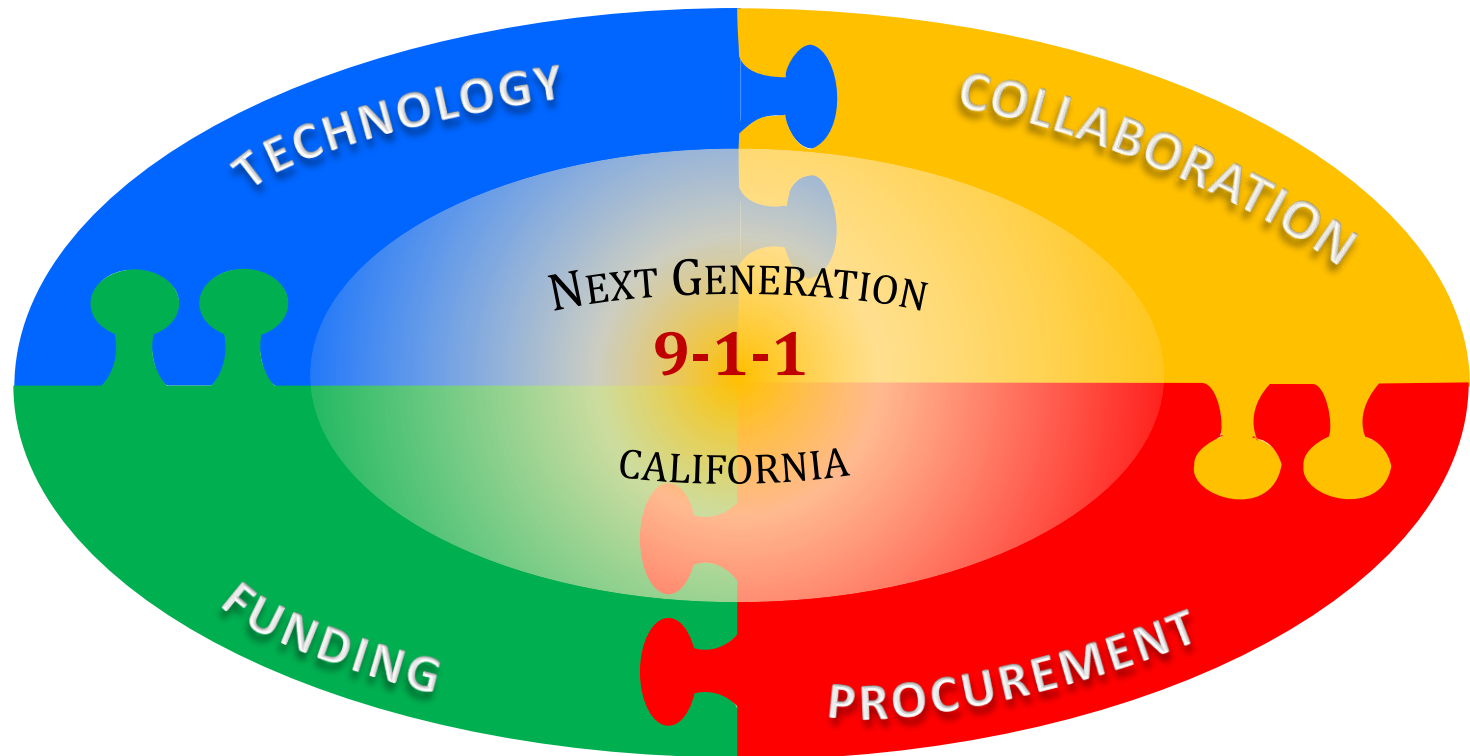


- CPE – Customer Premise Equipment
- ESN - Emergency Service Number
- ALI – Automatic Location Information
- ANI – Automatic Number Identification
- pANI - Psuedo ANI
- VoIP – Voice over IP
- MSC – Mobile Switching Center
- VPC – VoIP Positioning Center

Why Next Gen 9-1-1?

- Faster call delivery
- Increased routing accuracy
- Increased routing functionality
 - Call overflow and backup
- Updated Geographic Information System (GIS)
- Prepared for wireless location data
- Prepared for newer technologies
- Keeps California in driver's seat

Next Gen 9-1-1 in California

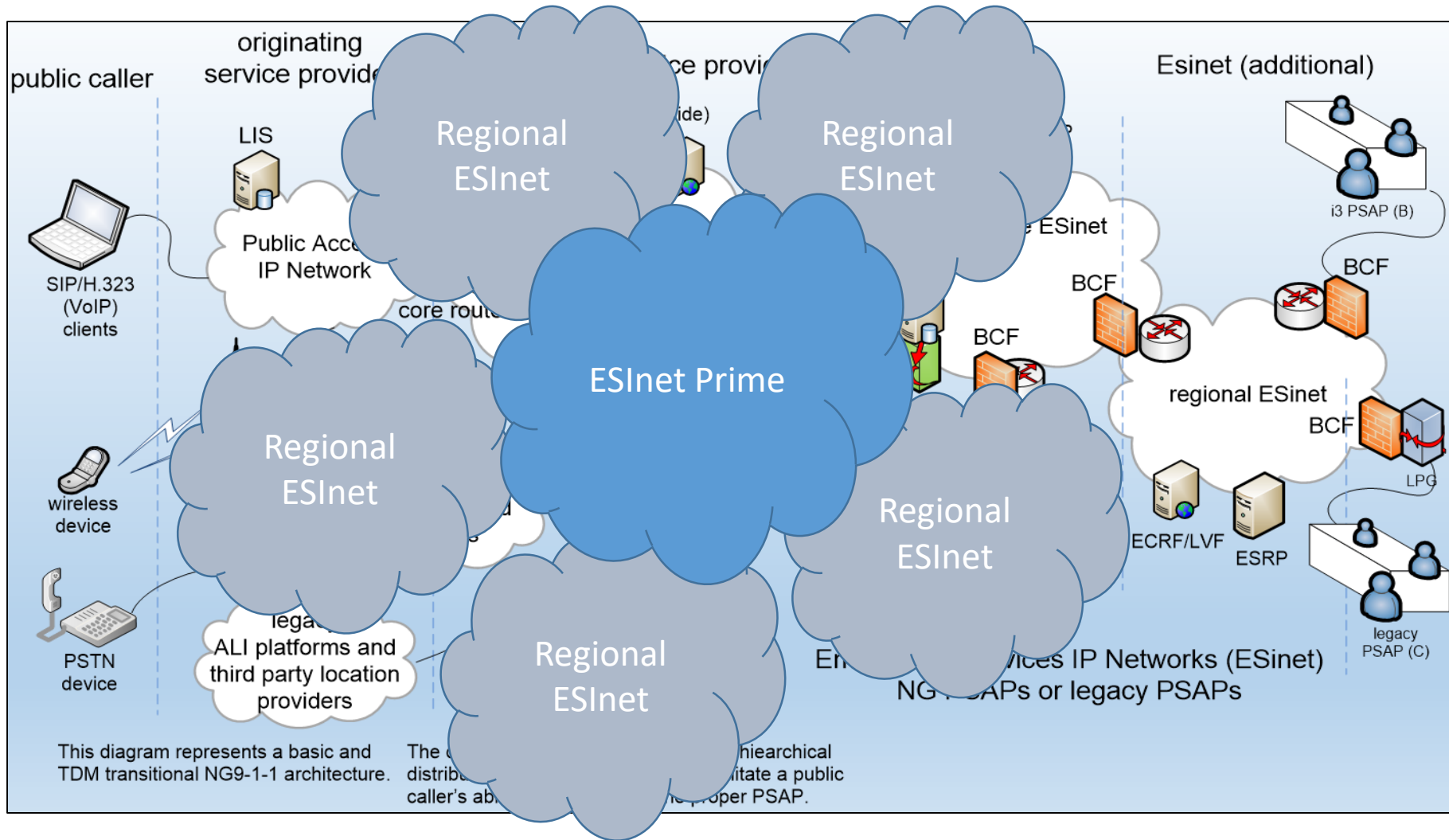




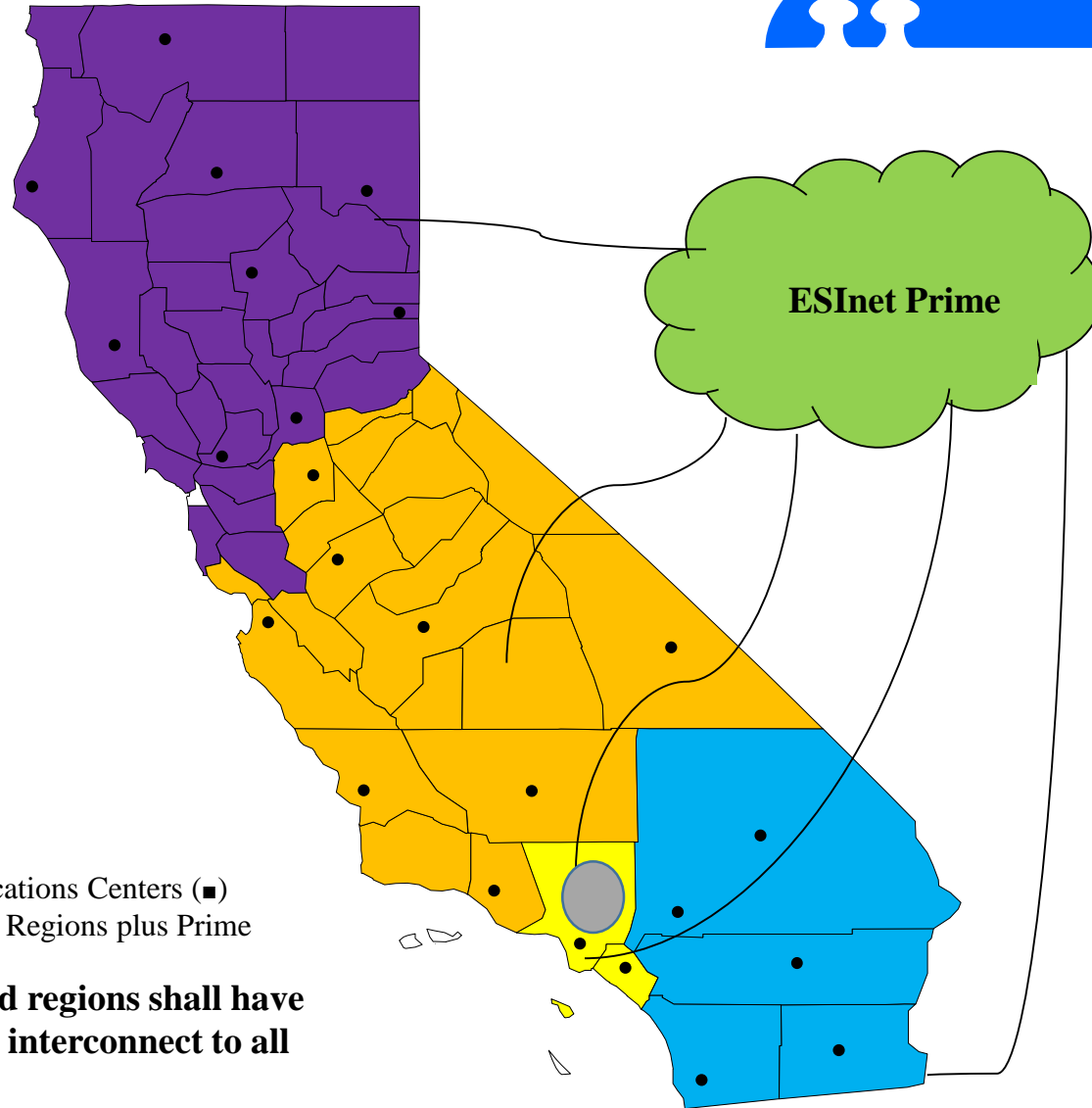
Next Gen 9-1-1 Details

- California will build Regional ESInets that comply with NENA i3 standard
 - 45 Selective routers
 - 11 Local Access Transport Area (LATA) boundaries
 - 441 PSAPs
 - 28.5 Million 9-1-1 Calls per year

Next Gen 9-1-1 Design



Next Gen 911 ESInet Statewide Regional Map



Northern Region

Central Region

Los Angeles City

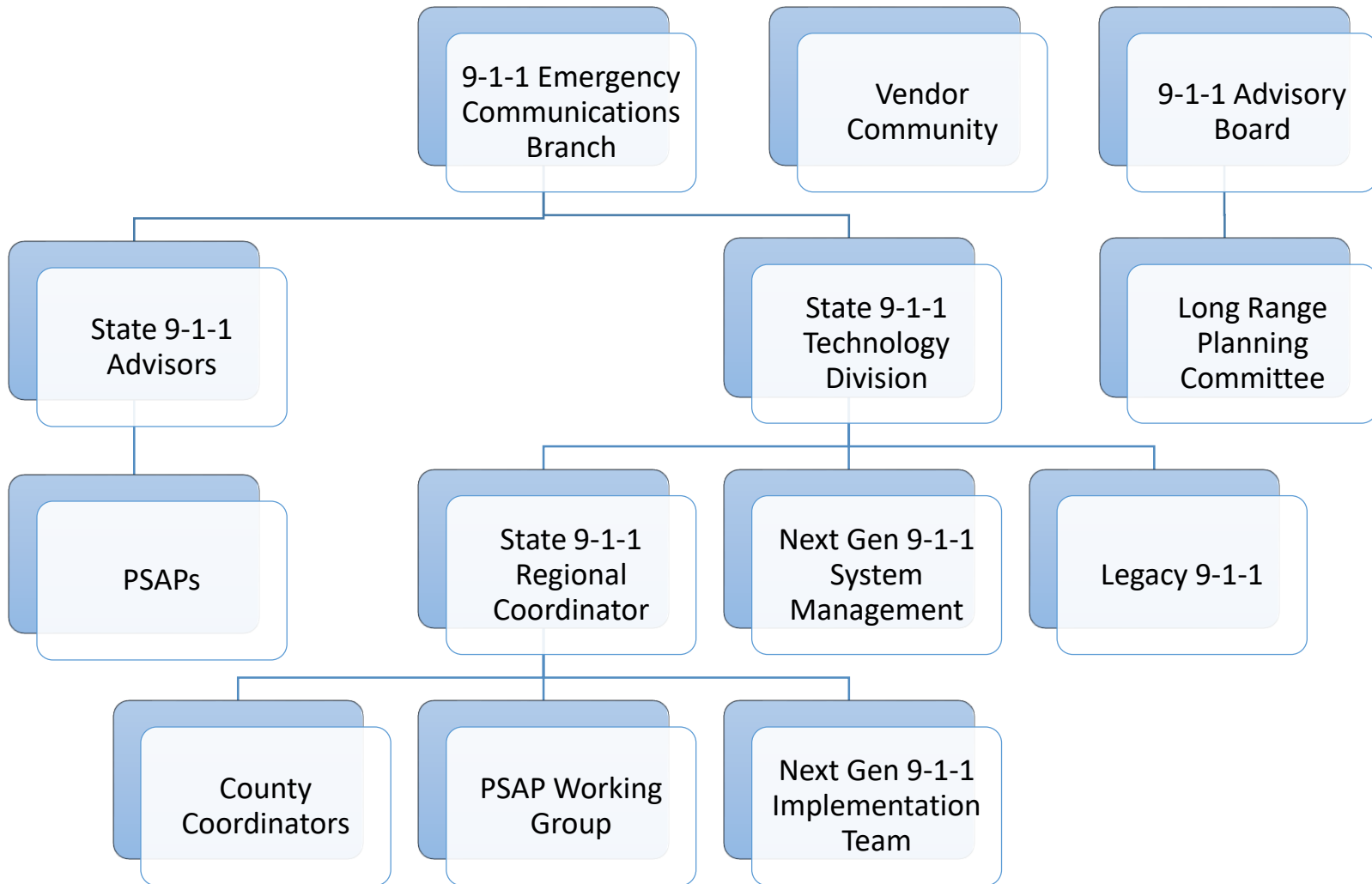
Los Angeles County

Southern Region

Map Depicts:
-58 Counties
-24 CHP Communications Centers (■)
-5 Defined ESINET Regions plus Prime

All five identified regions shall have the capability to interconnect to all other regions.

Governance Structure



Funding Plan



- Near Term (FY 2017/2018)
 - Use fund balance to support Next Gen 9-1-1 deployment
- Long Term (FY 2018/2019)
 - Remove technology specific language from SETNA funding model

What will it cost?



| Year | Legacy 9-1-1 costs | NG9-1-1 costs | Estimated Total |
|------------|--------------------|---------------|-----------------|
| FY 2017-18 | \$104,250,000 | \$10,000,000 | \$114,250,000 |
| FY 2018-19 | \$102,250,000 | \$25,000,000 | \$127,250,000 |
| FY 2019-20 | \$76,469,000 | \$44,000,000 | \$120,469,000 |
| FY 2020-21 | \$65,569,000 | \$66,000,000 | \$131,569,000 |
| FY 2021-22 | \$54,669,000 | \$88,000,000 | \$142,669,000 |
| FY 2022-23 | \$50,200,000 | \$97,020,000 | \$147,220,000 |

Procurement Options



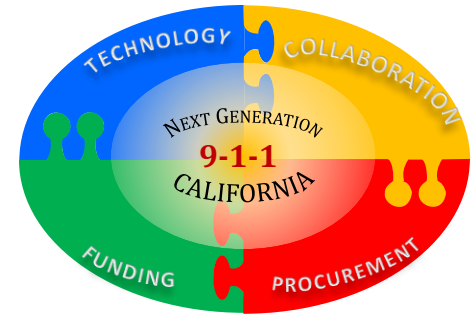
- Typical for Regional ESInet Procurement
 - ~24 months to develop contract
 - ~18 months to deploy ESInet
 - Typically a 3-7 year contract term
- We will have six ESInets and one prime – the implication is perpetual procurement
- Other Options
 - Contract Vehicle that allows services to transition
 - National Association of State Procurement Officials (NASPO – Formerly WSCA)
 - Tariff
- Other Contracts

Procurement Plan



- Near Term (1-3 years)
 - Use the existing Next Gen IFB
 - Develop SOW
 - May need to amend IFB
- Long Term (3-5 years)
 - Develop contract similar to CalNet
 - Use for all 9-1-1 services

Deployment Timeline



- Northeast ESInet– Jun 2017-Dec 2018
- Pasadena ESInet – Jul 2017 – Jun 2018
- Prime ESInet – Jan 2018 – Jan 2020
- Southern ESInet – Mar 2018 - Sept 2019
- Central ESInet – Sept 2018 – Mar 2020
- Coastal ESInet – Jan 2019 – June 2020
- LA County – May 2019 – Oct 2020
- LA City – Sept 2019 – Mar 2021
- All selective routers decommissioned - 2022

Next Gen 9-1-1 PSAP Meetings

July 14 – Bay Area Region

10:00 – 13:30

Alameda County OES facilities

4985 Broder Blvd, Dublin, CA 94568

July 18 – Sacramento Region

09:00 – 12:00

Rocklin Police Department

4080 Rocklin Road, Rocklin, CA 95677

July 20 – Northern Region (w/FirstNet)

09:00 – 15:00

Redding City Council Chambers

777 Cypress Ave., Redding, CA 96001

July 21 – Coastal Region (w/FirstNet)

10:00-16:00

PG&E Kendall Rd Campus

July 25 – Los Angeles Region

10:00 – 13:00

USFS – Angeles National Forest HQ

701 N. Santa Anita Ave.

Arcadia, CA 91006

July 26 – Inland Region

09:00 – 12:00

San Bernardino Sheriff's Department

Aviation Division

199 N. Hangar Way

San Bernardino, CA 92415

July 27 – Southern Region

Escondido PD

1163 Centre City Parkway

Escondido, CA 92026

10:00 – 13:00



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QUESTIONS