



# FirstNet™

## Vision for the Future

Regional Workshop

May 15, 2013



### Jeffrey D. Johnson, Chief (Ret.)

CEO Western Fire Chiefs Association  
Acting Customer Advocacy Officer  
FirstNet Board Member

### Craig Farrill

Acting CTO  
FirstNet Board Member

# What We'll Cover

**VISION AND GUIDING PRINCIPLES**

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**LEARNING FROM PUBLIC SAFETY**

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**RESEARCH AND ANALYSIS**

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**PROJECT PHASES**

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**THE STATE CONSULTATION PROCESS**

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**CLOSE – PERCEPTIONS AND REALITIES**



# What is the vision of FirstNet?



# VISION

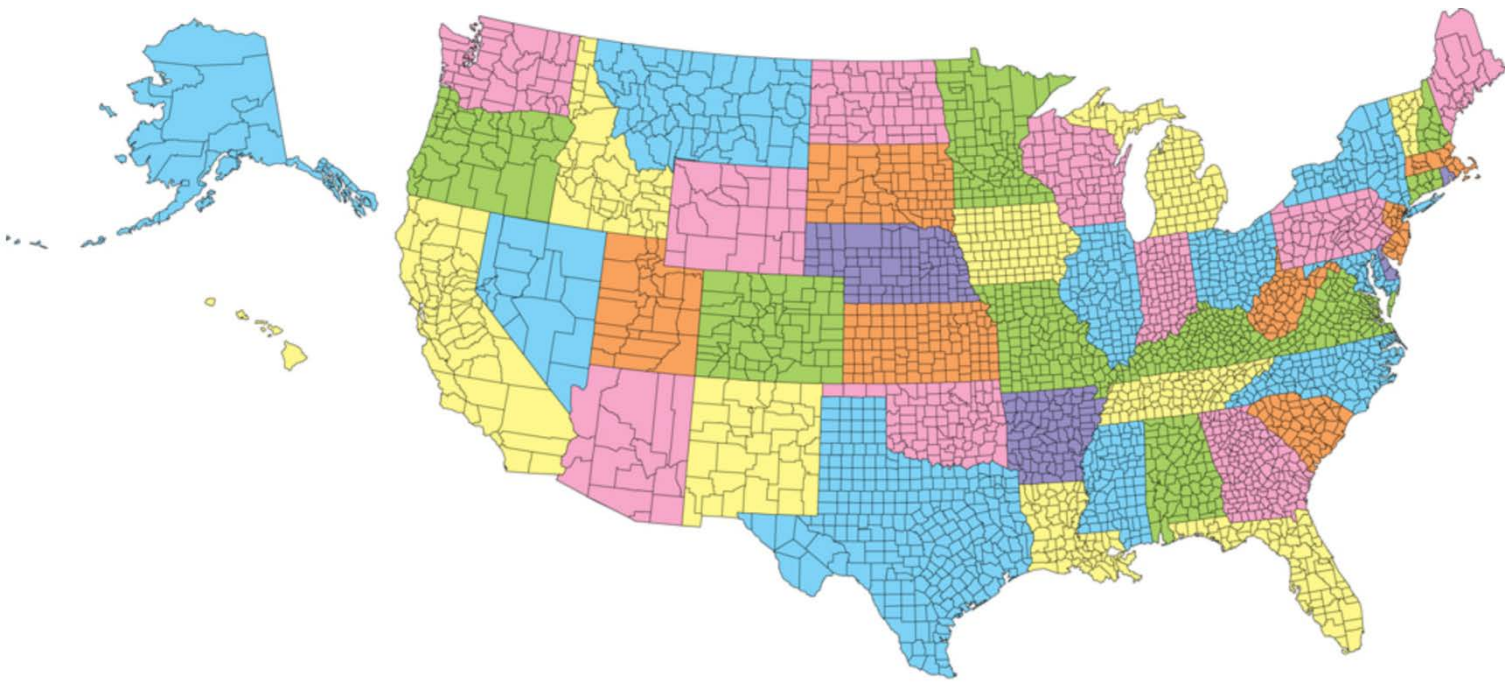
To provide emergency responders with the first nationwide, high-speed, wireless broadband network dedicated to public safety



**“FirstNet will be a force multiplier, enabling collaboration to help save more lives, solve more crimes and keep communities safer.”**

**Jeffrey D. Johnson, Chief (Ret.)**  
Chief Executive Officer — Western Fire Chiefs Association  
FirstNet Board Member

**FirstNet will work toward supporting first responders wherever their need is.**



That includes  
3,252 counties  
across 50 states and  
6 commonwealths/  
territories.



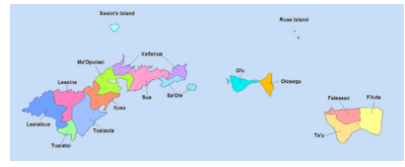
**DC**



**Puerto Rico**



**Virgin Islands**



**American Samoa**



**Guam**



**Northern  
Mariana  
Islands**

**FirstNet will provide dedicated spectrum, a single technology and funding to create a nationwide network dedicated to public safety.**



### **Public Safety Effectiveness**

- Dynamic Priority Access
  - Force Multiplier

### **Public Safety Grade**

- Reliable
- Hardened
- Redundant

### **Public Safety Applications**

- 4G data for video and web
- Non mission-critical voice

## 4G LTE: A Proven Next Generation Technology

- Fastest data speeds
- A bigger pipe
- Field-tested across the country
- Global technology standard
- Being adopted as a standard for public safety
- Non-mission critical voice



“ First responders need a network they can rely on and trust to get the job done, even in the worst of circumstances. That’s what FirstNet will build. ”

**Chuck Dowd**  
Assistant Chief of Police, New York City  
FirstNet Board Member

## FirstNet Will Augment LMR



- Public safety will rely on LMR for mission-critical voice for many years
- FirstNet can be co-located on existing LMR infrastructure
- Sharing infrastructure will keep costs down and enhance coverage
- Our goal is to allow voice to pass between the two networks



## What will it cost?



**“ FirstNet intends to offer public safety grade services at a cost that’s compelling to users. ”**

**— FirstNet Tenet**

# Our goal is to build a nationwide network.

- There are many unanswered questions. Each will get an answer over time, and we'll start down that path today.
- The purpose of this workshop is to start to learn about your needs and to share with you what we've been researching and thinking about.
- Let's get started...

# LEARNING FROM PUBLIC SAFETY

The Foundation of our Planning





- Public safety fought for D-Block.
- Legislation was a victory born of that effort.
- It established a path for a dedicated network.
- It set up its own governance board with public safety.
  - Board members
  - PSAC

**FirstNet was created by public safety, for public safety.**

## Public Safety Advisory Committee activities



- Executive Committee had a two-day briefing with FirstNet technical team in March
- Executive committee will meet monthly for updates with the General Manager
- Outreach for conferences
- Handling specific projects

# Public Safety Input To Date: More than 1,300 Requirements



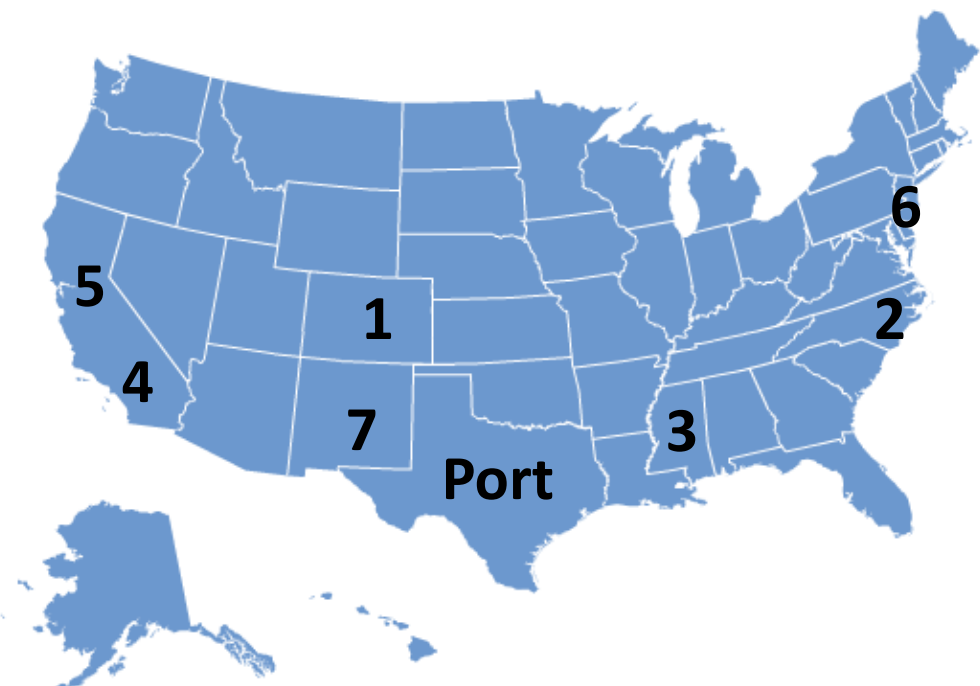
NPSTC Requirements	# of Req's
User Services	312
Network Services	209
Transport Requirements	154
System Design	66
User Equipment	60
Local Operations Support	157
Migration and Evolution	60
Governance	10
Policies and Procedures	94

FCC Minimum Interoperability Specifications	# of Req's
Requirements (Must)	46
Considerations (Should)	55
Interfaces (Architectural)	11
Recommended Interfaces Requirements	9

 **FirstNet** will:

- Build on the foundation of early work done by public safety groups
- Seek vendors who will meet or exceed these requirements
- Broaden the requirements to increase flexibility and decrease costs

## FirstNet Pilot Projects\* will provide broad learning opportunities.



\* Seven current BTOP projects, and Texas

BTOP Grantees
1. Adams County, CO
2. Charlotte, NC
3. Mississippi
4. LA-RICS (Los Angeles)
5. Bay-RICS (San Francisco)
6. New Jersey
7. New Mexico
Ports
Harris County, TX

- International interference
  - Operational issues
  - Applications

## Learning from Pilot Project Experiences

- Sites represent a substantial opportunity to demonstrate critical FirstNet functionality – starting in 2013.
- The FirstNet Board is negotiating a Spectrum Manager Lease Agreement (SMLA) with each of the seven BTOP grantees and recently authorized negotiations with Texas for the Harris County Project.
- FirstNet will work collaboratively with the pilot participants on “key learning areas” and share information with other projects, FirstNet and the public safety community.



# RESEARCH AND ANALYSIS

The First Phase of our Work

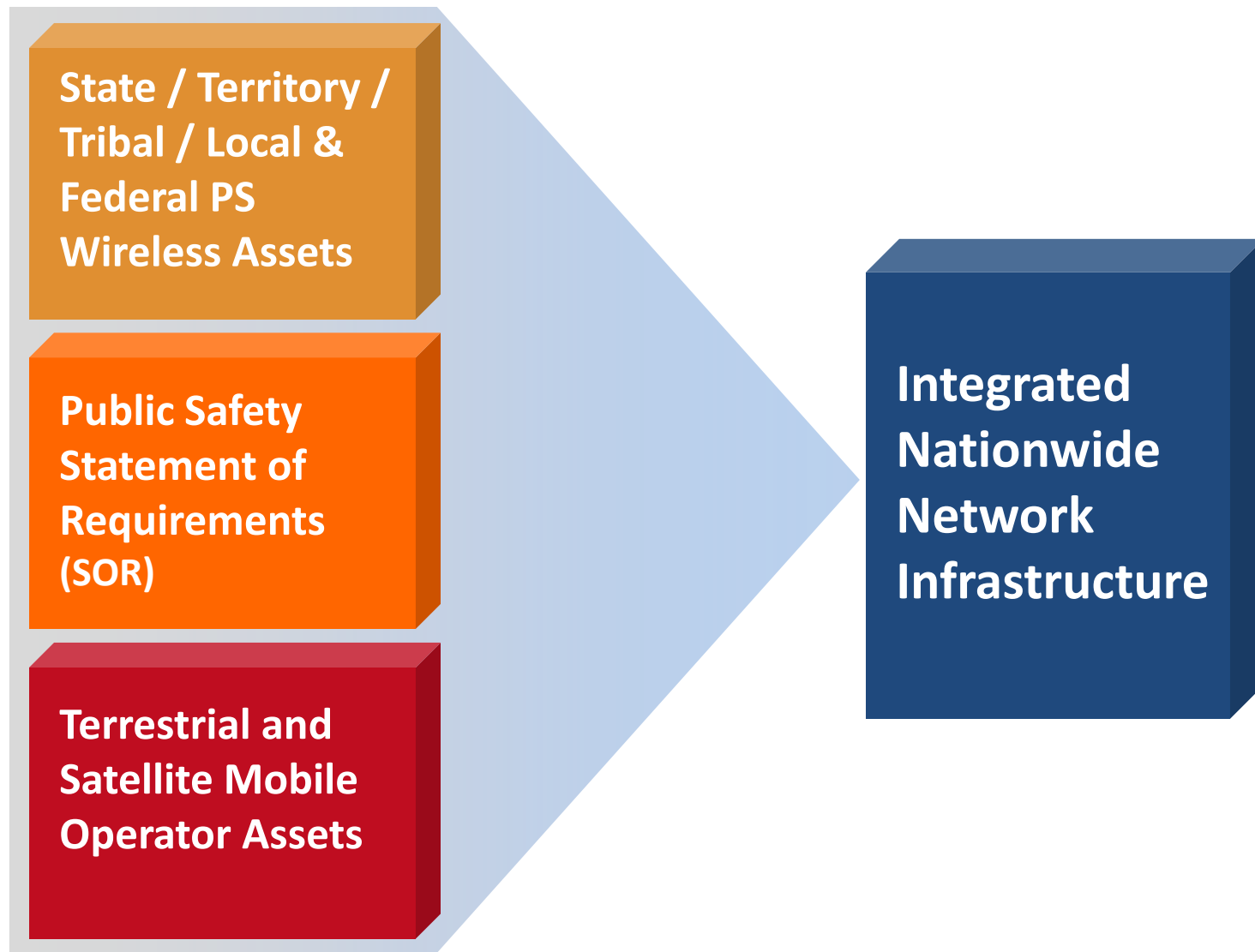


## This section is about...

- Our current thinking
- Concepts and analysis, **not** decisions
- Work we need to complete to move FirstNet forward
- Analysis that can't be completed until we get input from you
- Models that help us understand what is possible, technically and financially



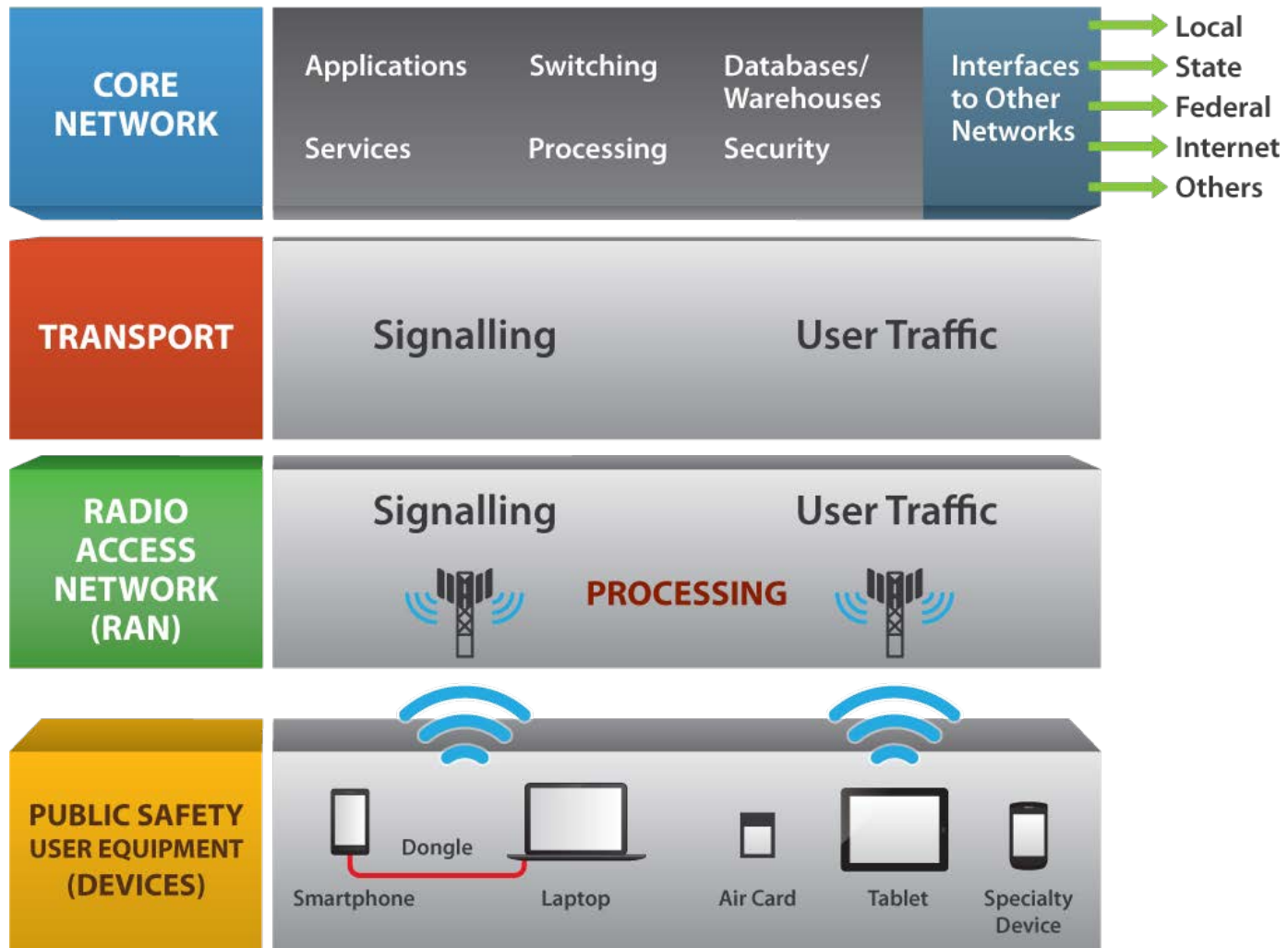
## FirstNet integrates public safety requirements and assets.



# Working with the public safety community, we will define what “public safety grade” means.

FirstNet Attribute	Defining Public Safety Grade
Coverage Area	“Where Public Safety needs it” (Geographic)
Reliability	“You can bet your life on it”
Levels of Backup	“Multiple fallback options”
Emergency Communications	“Your trusted resource”
Group Communications	“Essential to teamwork”

# Fundamental building blocks that make up a network



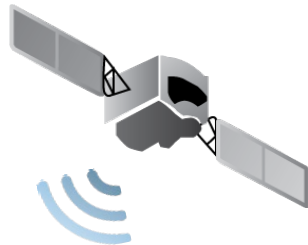
## Network Analysis Areas

- **Architecture** – which FirstNet nationwide network (FNN) configuration will best serve public safety users now and into the future?
- **Coverage and Capacity** – how will the FNN perform during major events, large-scale disasters, extended periods without power?
- **Dynamic Priority and Control** – situational management will be needed to support field operations with immediate access needs. How will FNN support this requirement at the nationwide and local level when established hierarchies need to take the lead?
- **Security** – how will the FNN deliver and store data securely and keep confidential and sensitive information safe from cyber or physical attack?
- **Resiliency** – how will FNN ensure the network will perform when the network itself may be damaged during a disaster? How can multiple networks be employed to achieve high reliability?

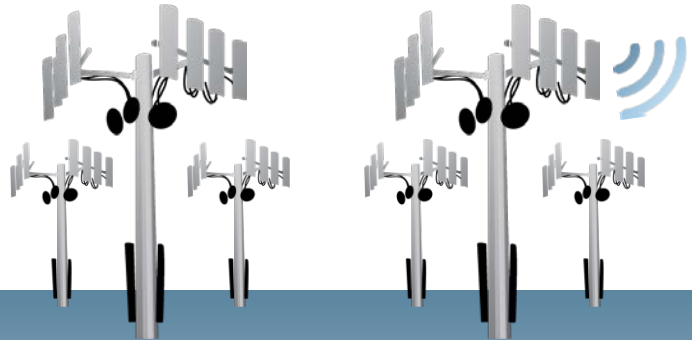
# Diverse Coverage Architecture: considering a “3-in-1” Approach: Terrestrial + Satellite + Deployable



**#2:  
Mobile Satellite Systems**



**#1:  
Multiple Terrestrial Mobile Systems**



**#3:  
Deployable Systems**



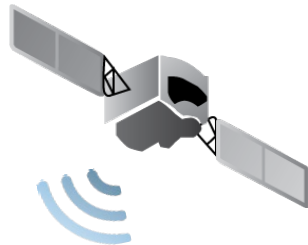
**Public Safety User**



# Diverse Coverage Architecture: considering a “3-in-1” Approach: Terrestrial + Satellite + Deployable



**#2:  
Mobile Satellite Systems**



**#1:  
Terrestrial Mobile System**



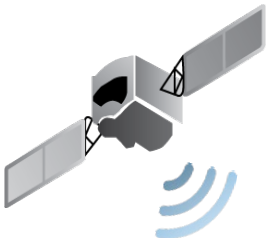
**#3:  
Deployable Systems**



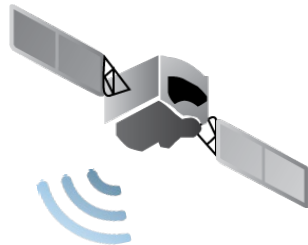
**Public Safety User**



# Diverse Coverage Architecture: considering a “3-in-1” Approach: Terrestrial + Satellite + Deployable



**#2:  
Mobile Satellite Systems**



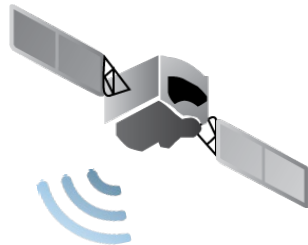
**#3:  
Deployable Systems**



**Public Safety User**

# Diverse Coverage Architecture: considering a “3-in-1” Approach: Terrestrial + Satellite + Deployable

**#2:  
Mobile Satellite System**



**#3:  
Deployable Systems**



**Public Safety User**

# Diverse Coverage Architecture: considering a “3-in-1” Approach: Terrestrial + Satellite + Deployable

**#3:  
Deployable Systems**

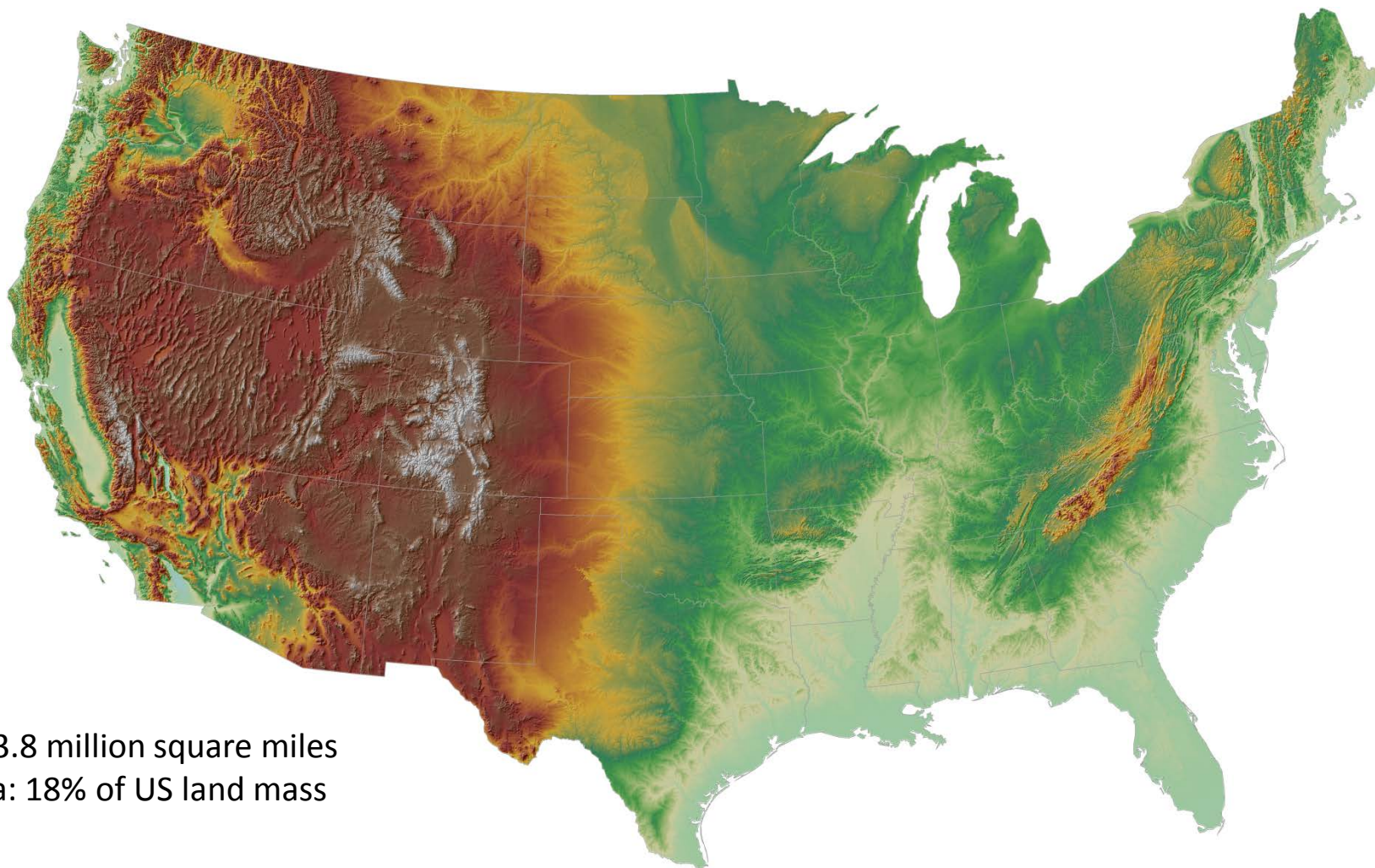


**Public Safety User**

# Radio Access Network Analysis Components

- **RAN Planning:** Analysis consists of radio planning assumptions and engineering rules to optimize coverage, capacity and performance for a nationwide deployment.
- **Cell Count Reference Point:** Initial modeling has shown that approximately 35,000 sites could cover 99.6% of the population and the nation's highway system.
  - This is an initial model and estimate and subject to change.
  - Requirements and data from each of you will adjust the model and improve it.
- **Cell Range:** Several techniques for extending rural coverage are under evaluation.
- **Radio Planning Tools:** Planning tools will be used to provide a consistent prediction of radio coverage and for comparison of RAN alternatives.

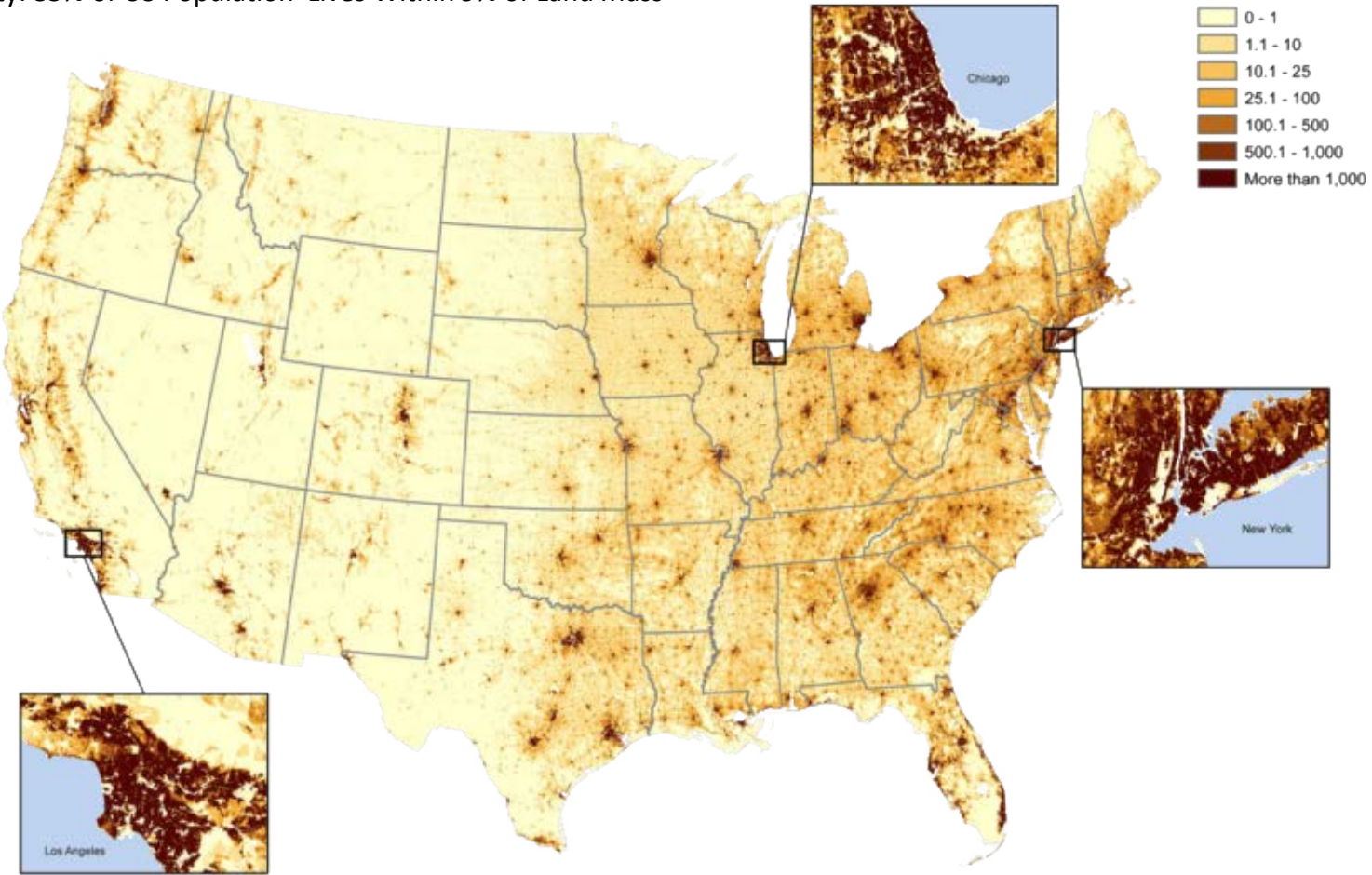
# Terrain Ruggedness: a major impact on radio propagation



USA: 3.8 million square miles  
Alaska: 18% of US land mass

# Population is a starting point, but public safety events don't always happen where people live.

Population Density: 85% of US Population Lives Within 9% of Land Mass



# Our nation's highways are assets to leverage.



National Highway System: as Defined by the Federal Highway Administration

**FirstNet coverage considerations go far beyond those of commercial networks.**

**Public Safety Factors**

- 
- Jurisdictional boundaries
  - Rural and unpaved roads
  - Population scarcity
  - Critical infrastructure
  - Crime data
  - Natural disasters
  - Tribal lands
  - Parks and open space
  - Underserved areas
  - Utility infrastructure



## Core Network Analysis Components

- **Nationwide Core Network Architecture:** Most public safety traffic is local. To optimize routing, ensure latency requirements and implement local control, a distributed nationwide architecture is being conceptualized.
- **National Core Network Hubs:** FirstNet is analyzing multiple regional locations with redundant transmission systems to be located in or near existing hardened, fiber backbone networks.
- **National Data Centers:** Based on Department of Commerce direction, FirstNet is analyzing leasing from approved 3<sup>rd</sup> party providers which meet FISMA and TIA security requirements.
- **Network Services and LTE / Public Safety Standards:** NPSTC requirements will be supported at launch. FirstNet will help drive critical public safety functionality into the next LTE standards releases.

**Network resilience, fault tolerance, redundancy, diversity in all aspects of the network and its operations.**

## RESILIENCY

### PHYSICAL

Building to sustain network in adverse conditions

### OPERATIONAL

Maintaining the network to ensure reliability (spares management and preventative maintenance, primary assets recovery after outages)

## REDUNDANCY

### PHYSICAL

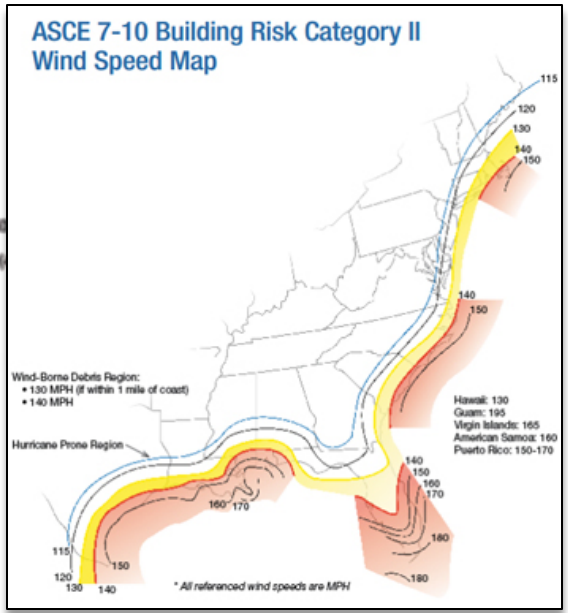
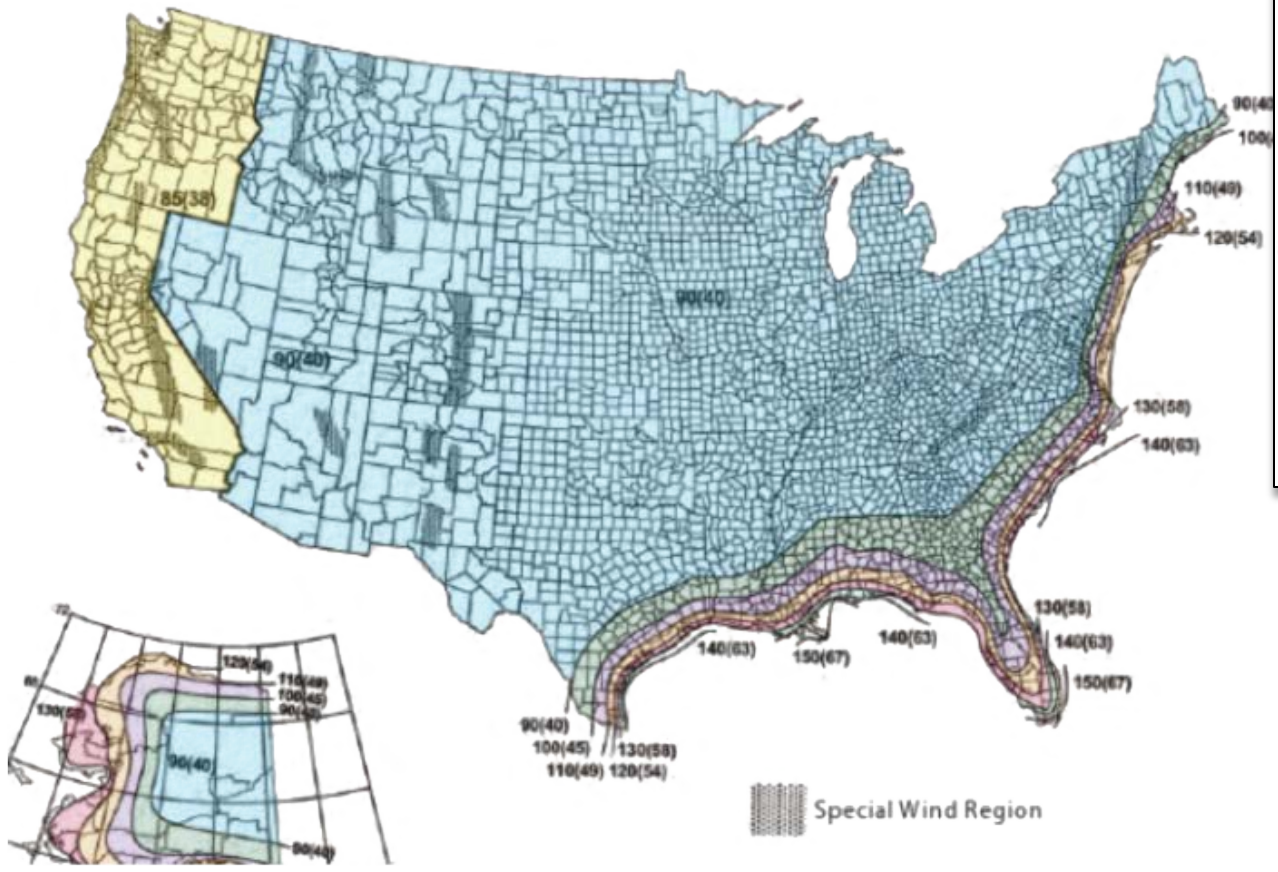
Avoiding single points of failure across the network (power, backhaul, sites, coverage)

### OPERATIONAL

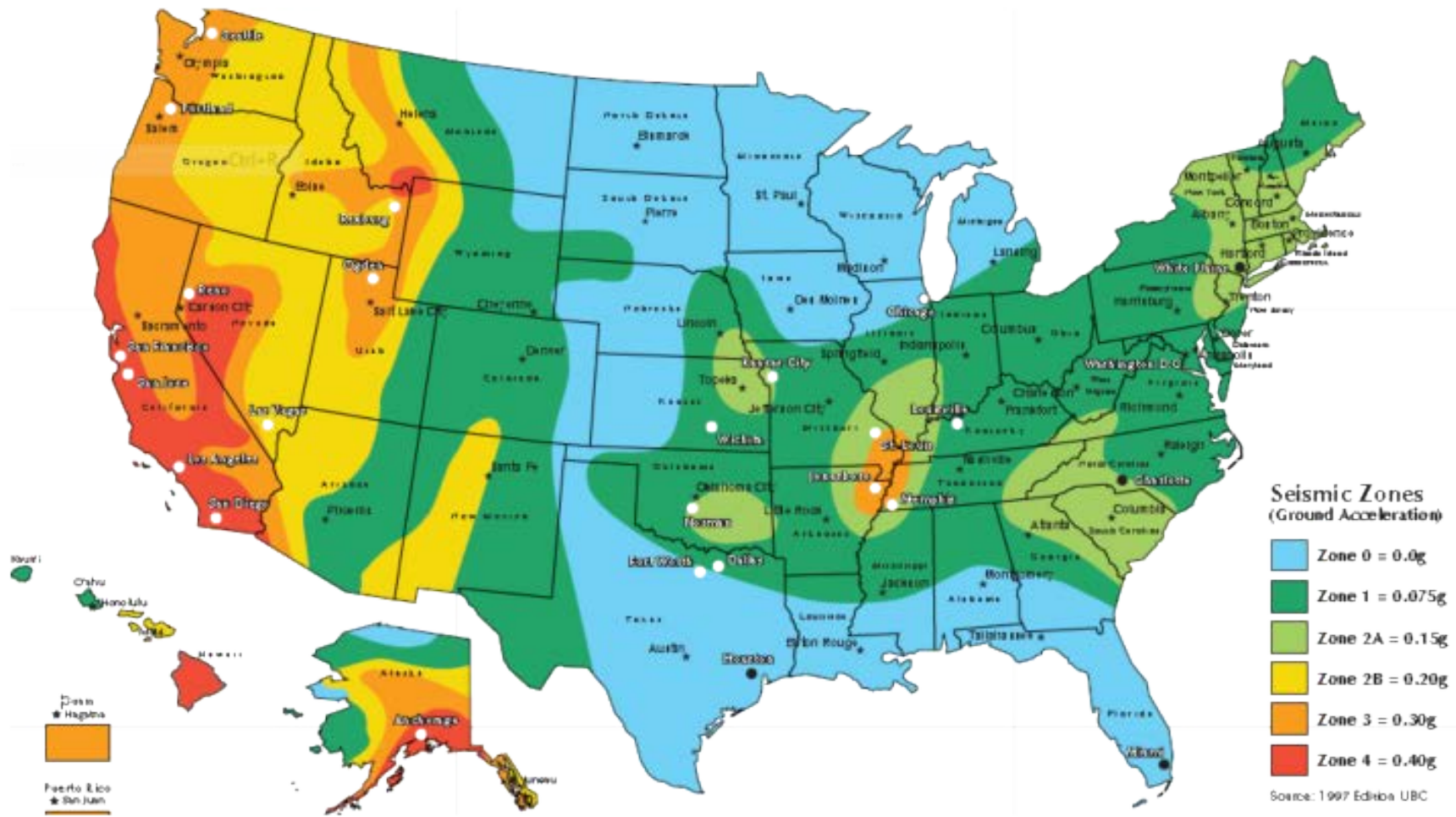
Providing backup equipment (Deployables) and technology (commercial carrier roaming/direct mode) that facilitate operations during primary network failure

# Wind zones will require more robust hardening...

REV G 3-SECOND BASIC WIND SPEED MAP



...as will seismic zones. Hardening is not one size fits all.



# Dynamic Priority and Control



- During emergencies, some public safety users, applications and situations require elevated access levels depending on various factors and authorizations.
- FirstNet needs a prioritization scheme that can be enacted at the local level. This is especially true in large-scale events where established hierarchy with role-based levels of priority will be key to maintain services to first responders.
- Need to define a nationwide process for **dynamic priority access**
- Solutions for prioritization will be tested and evaluated

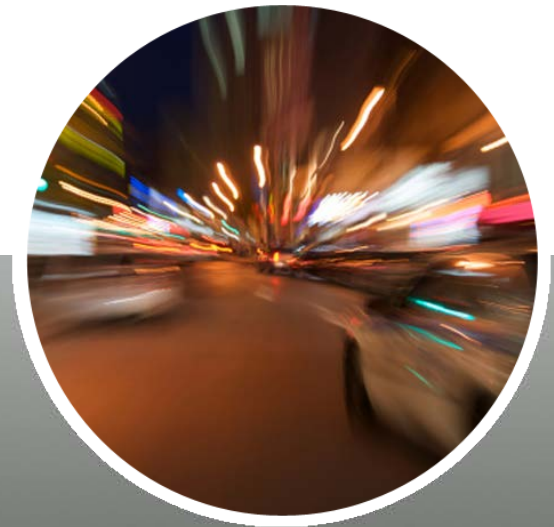
## FirstNet is Committed to:

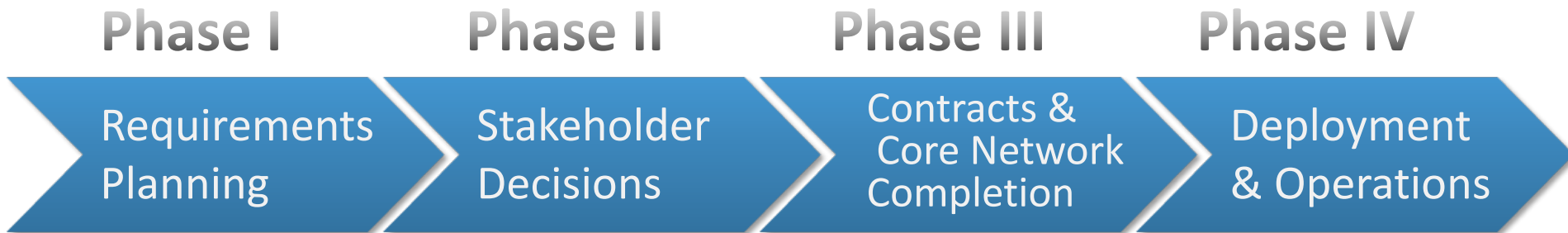
- Creating a nationwide architecture and standards with local management and adaptation.
- Working with all key stakeholders to plan, coordinate and optimize the use of existing wireless facilities to reduce network spend.
- Building relationships with all 56 states and territories. Working together from your requirements, we will build a fully-integrated public safety-grade nationwide wireless broadband network which serves first responders and public safety for decades to come.

Please join is in this mission.

# FIRSTNET PROJECT PHASES

Timeline and Gating Items







# Phase I



- Stakeholder consultation (state, local and tribal)
- User and network requirements
- Network RFIs
- SLIGP Phase 1 - Requirements Gathering
- Initial design concepts documented

## Phase II



- SLIGP Phase 2 - Data Collection
- Core and RAN specifications
- Network RFPs issued
- Pilot Project integration and device planning
- FirstNet business model
- State RAN plan build-out documents issued

## Phase III



- Contracts and contractors (operating partners, core, RAN, site development, user support services)
- Core network deployment/integration
- Device original equipment manufacturer (OEM) agreements
- Data center integration
- Initial pilot project (BTOP) integrations

## Phase IV

Requirements  
Planning

Stakeholder  
Decisions

Contracts &  
Core Network  
Completion

Deployment  
& Operations

- Spectrum clearing
- Network deployment
- Network testing/interworking
- Billing/user support services
- Device testing and field deployments
- Operational process trials

# STATE & LOCAL CONSULTATION PROCESS

Input and Requirements



## Workshops are just the start.

FirstNet will continue to consult with the states, tribes, territories and localities until we have the information we need to develop state network build-out plans.

Activities	When
Nationwide, Regional Workshops	May – June 2013
Individual State Meetings	Beginning June 2013
Data Gathering	Commencing with Phase 2 SLIGP Funds Release



## Information and data needed.

- **Only what's needed:** The data request will be structured to be as efficient as possible.
- **What is needed:** FirstNet requires input and requirements from state, local and tribal entities to prepare network plans for state review. Examples include:
  - Architecture of an evolved packet core and radio access network
  - Required coverage areas of the network
  - Hardening, security, reliability, and resiliency requirements
  - Assignment of priority users and selection of secondary users
  - Training needs
  - Availability of assets that may be utilized

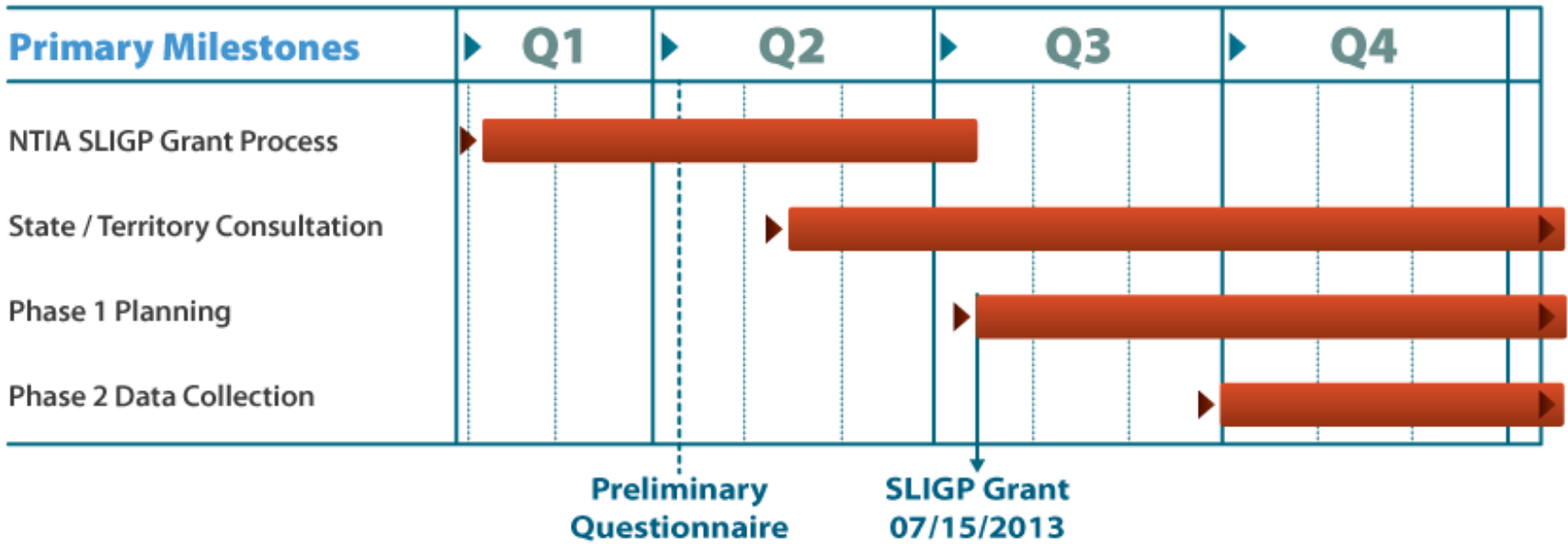
## Resources and help.

- **Funding:** State and Local Implementation Grant Program (SLIGP) funds will enable states to plan and collect data for the nationwide public safety broadband network.
- **Ability to preview the data elements:** FirstNet will share preliminary data needs with workshop participants for state feedback. The FirstNet team will use these consultations to finalize a full data request supporting the formal SLIGP effort.
- **Time to prepare:** FirstNet anticipates releasing the full data specification sometime during the summer of 2013.
- **Additional tools and support:** DHS Office of Emergency Communications has planning tools and some previously collected data that states can choose to use upon request.



**SLIGP Timeline (tentative)**

**2013**



- The SLIGP program runs for three years. FirstNet anticipates a significant amount of data will be collected early in the process.
- SLIGP Phase 2 is tentatively scheduled to start shortly after Phase 1.

# CLOSING THOUGHTS

Perceptions and Realities



# FirstNet exists to serve public safety.

## PERCEPTION

## REALITY



Public safety may have to give up autonomy and control.



FirstNet will be a nationwide platform; Public safety sets rules locally.

Public safety will lose management of devices, users and talk groups.



Public safety will maintain local management.

FirstNet will cost too much to build and operate.



FirstNet has substantial opportunities to partner to lower construction and operating costs.

States can use FirstNet spectrum to generate revenue.



Fees from the use of FirstNet spectrum must, by law, be reinvested to build, operate, maintain, and improve the network.

FirstNet will replace LMR networks.



FirstNet will augment LMR for many years.

FirstNet has already begun designing the network.



FirstNet is in the research and analysis phase and must have input from states and territories to design the network...let the workshop begin.

## FirstNet is committed to:

### **Balancing the need for input with the desire to make progress.**

- We have to invest time listening to all of our stakeholders up front. We need to understand state and local requirements, supplier capabilities and potential operating partner arrangements.

### **Following the requirements mandated by law that govern how we operate.**

- We will leverage existing public safety, wireless operator and utility infrastructure.
- All fees from the use of FirstNet spectrum will be reinvested to build, operate, maintain and improve the network.
- We will operate with transparency but will not make public information that could jeopardize our ability to negotiate the best arrangements for network equipment, devices and services.

### **Offering public safety-grade services at a cost that's compelling and attractive to users.**

- We will build a network that will be tailored to meet the needs of public safety. We will seek out scale economy advantages. We will work to save states millions of dollars by building, managing and maintaining FirstNet on their behalf.

**We're committed to listening to you and what your state needs.**



FirstNet will build a network for millions of public safety users who need to be able to send data and talk to one another to meet their mission.

Creating FirstNet will require an unprecedented level of public-private partnership, collaboration and shared commitment to the well-being of all Americans.



# Thank you.

[www.firstnet.gov](http://www.firstnet.gov)