

RESEARCH AND ANALYSIS

The First Phase of our Work

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FirstNet Board Member



This section is about...

- 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
- What FirstNet will be and do for you

Here's our current thinking...



FirstNet has researched many areas to get ready for state consultation.

Network Analysis Areas

- Architecture
- Coverage and Capacity
- Dynamic Priority and Control
- Security
- Resiliency and Reliability

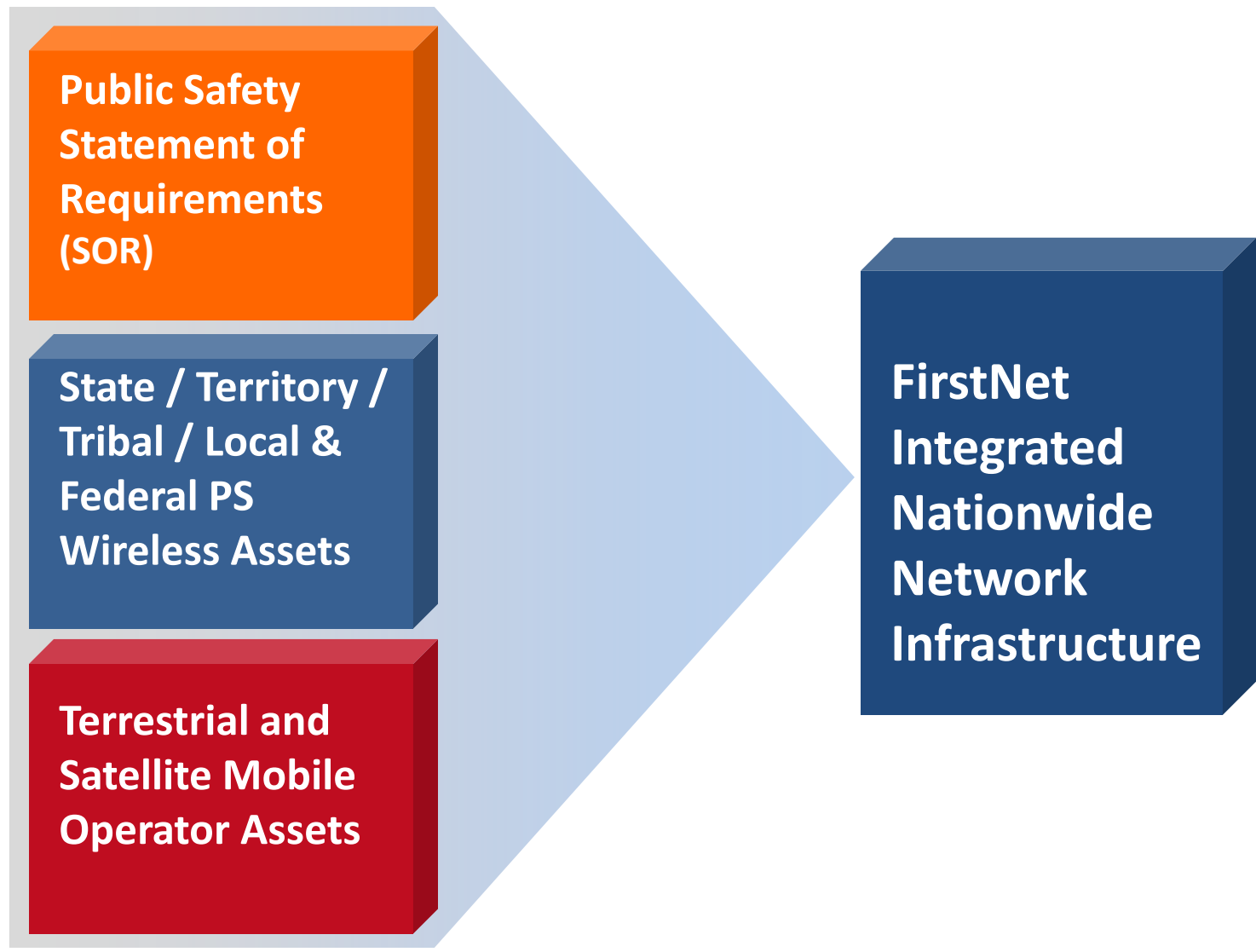
Radio Access Network Analysis Areas

- Performance Optimization
- Cell Range
- Radio Planning Criteria

Core Network Analysis Areas

- Core Architecture and Standards
- Distributed Hubs
- Data Centers

FirstNet will integrate public safety requirements and assets.



What will FirstNet do for you?



Communication

- Video: 1-to-many
- Messaging
- Images
- Group Text
- Voice: Non-Mission Critical

Applications

- Your applications (Private, Selective sharing)
- FirstNet Applications
- Syndicated Applications



Services

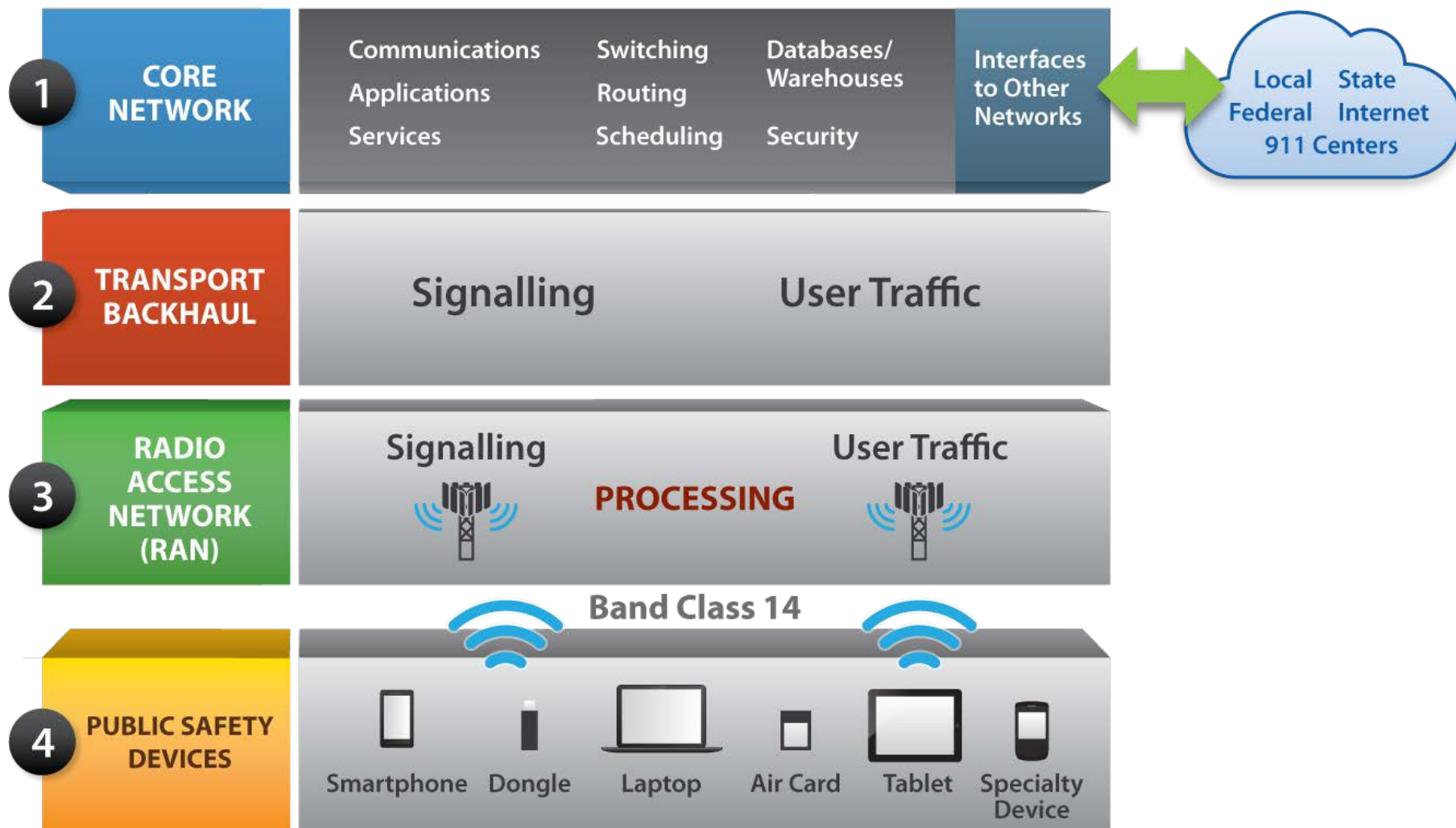
- Data Storage
- Recordkeeping
- Search
- Databases (CJIS, etc.)

Capabilities

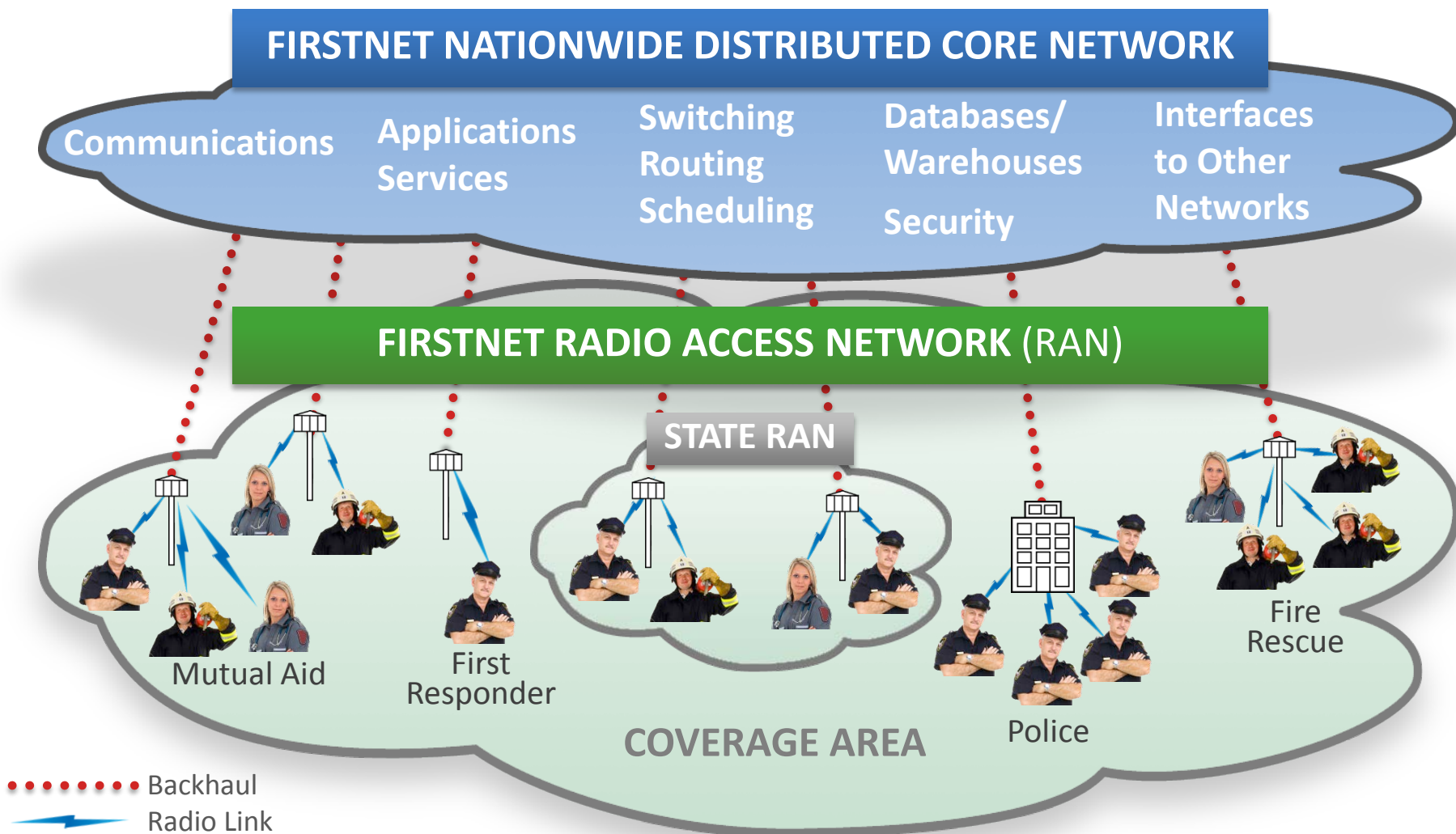
- NOC Status
- Activation
- Product Ordering
- Dynamic Priority Access



Four fundamental building blocks that make up a network



FirstNet: Nationwide Core and Local Radio Access Networks



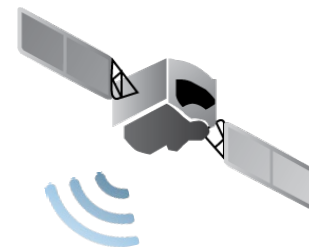
Working with the public safety community, we will define what “public safety grade” means.

FirstNet Attribute	Defining Public Safety Grade
Coverage	“Where public safety needs it” (Geographic)
Reliability	“You can bet your life on it”
Resiliency	“Multiple back-up options”
Emergency Communications	“Your trusted resource”
Group Communications	“Essential to teamwork”

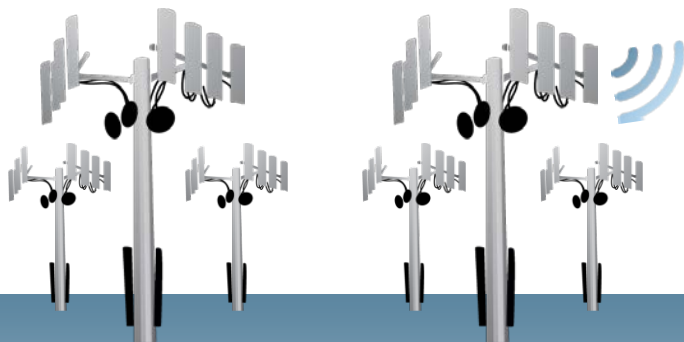
Diverse Coverage Architecture: considering a “3-in-1” Approach: Terrestrial + Satellite + Deployable



**#2:
Mobile Satellite Systems**



**#1:
Multiple Terrestrial Mobile Systems**



**#3:
Deployable Systems**



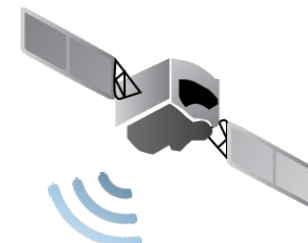
Public Safety User



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



**#2:
Mobile Satellite Systems**



**#1:
Terrestrial Mobile System**

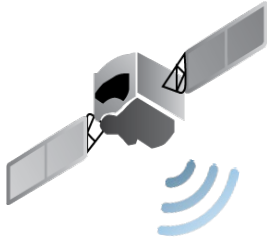


**#3:
Deployable Systems**

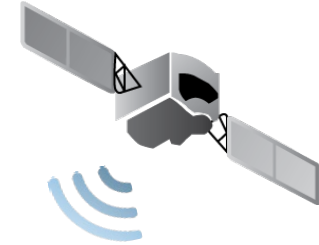


Public Safety User

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



**#2:
Mobile Satellite Systems**



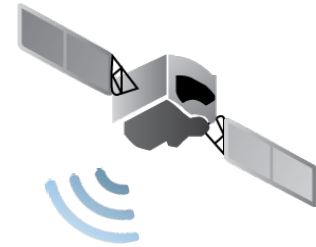
**#3:
Deployable Systems**



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

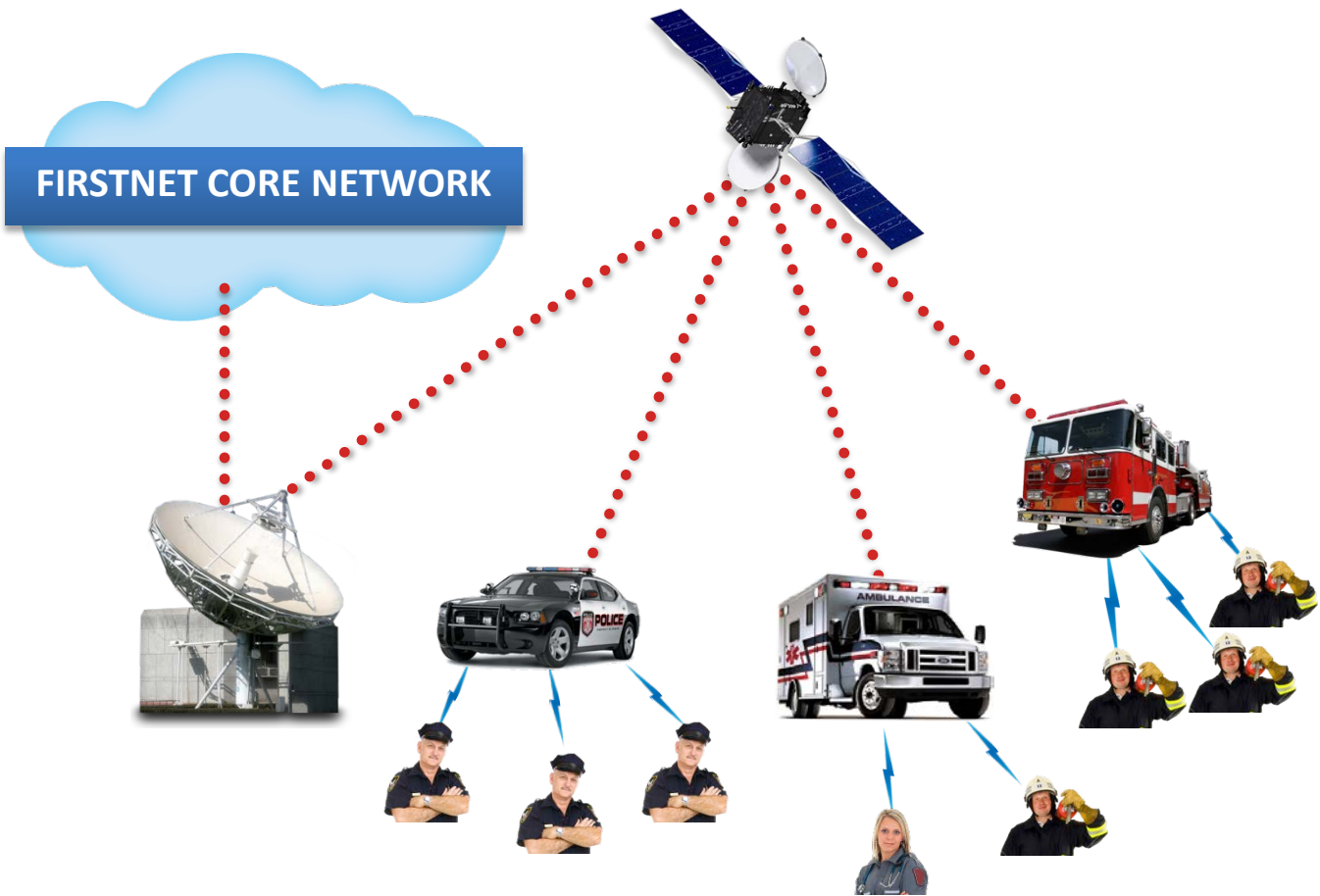
Diverse Coverage Architecture: considering a “3-in-1” Approach: Terrestrial + Satellite + Deployable

**#3:
Deployable Systems**



Public Safety User

Using satellite to connect to FirstNet Core services and applications.



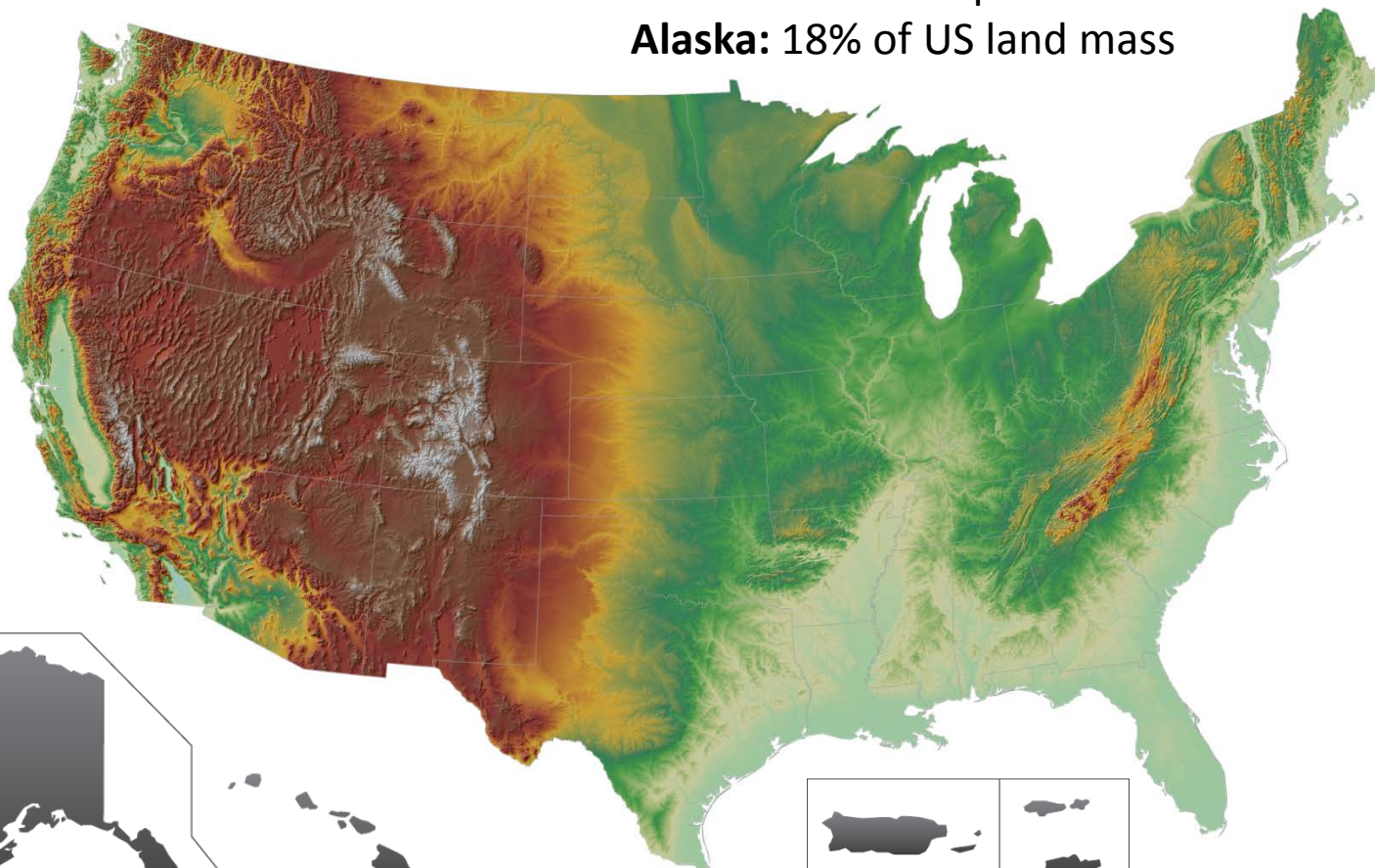
BENEFITS

- A vehicle-mounted and powered FirstNet BC14 PicoCell
- Local coverage in and around vehicle
- Works wherever satellite data links can be established
- Can serve:
 - Rural areas
 - Tribal lands
 - Wilderness
 - Parks and federal lands

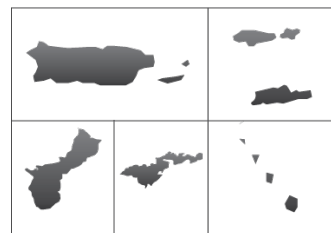
Terrain Ruggedness: a major impact on radio propagation

USA: 3.8 million square miles

Alaska: 18% of US land mass

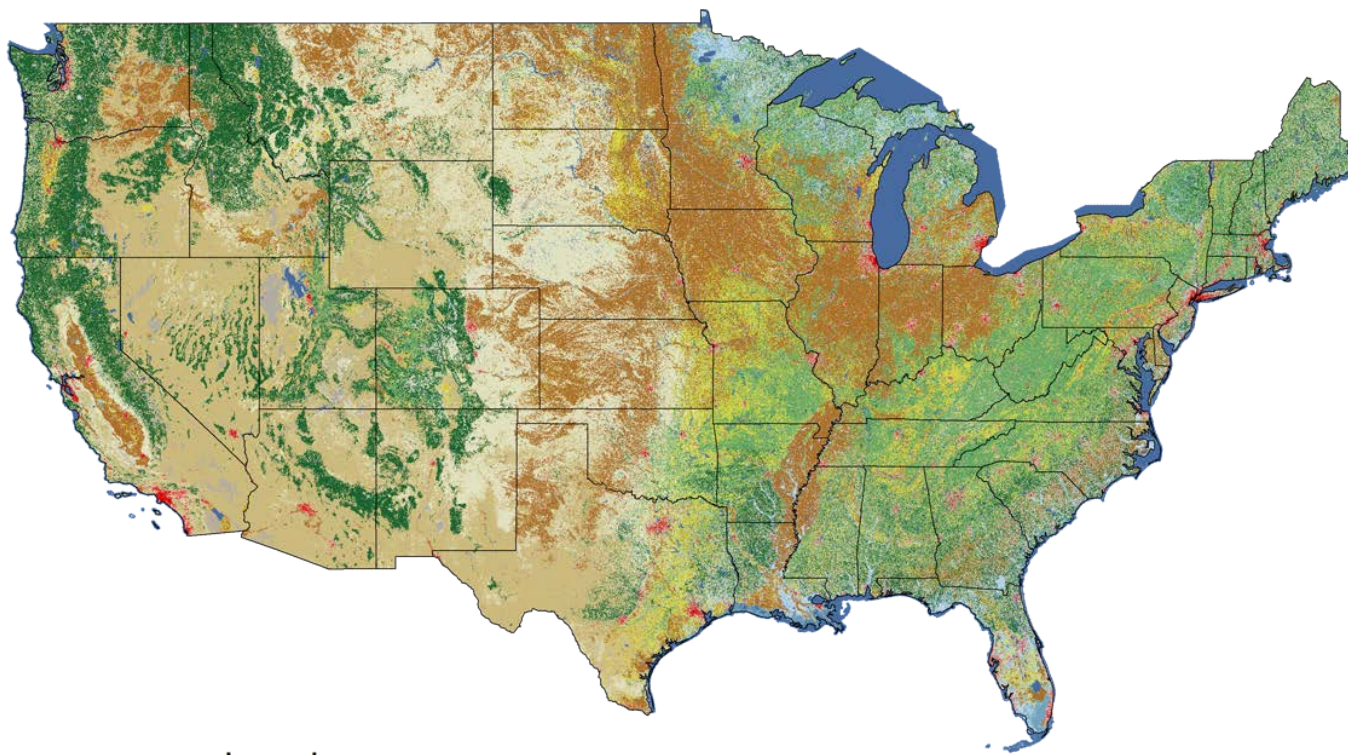


Terrain data for Alaska and Hawaii not immediately available






















Terrain data for U.S. territories not immediately available

Land use is significant to coverage planning.

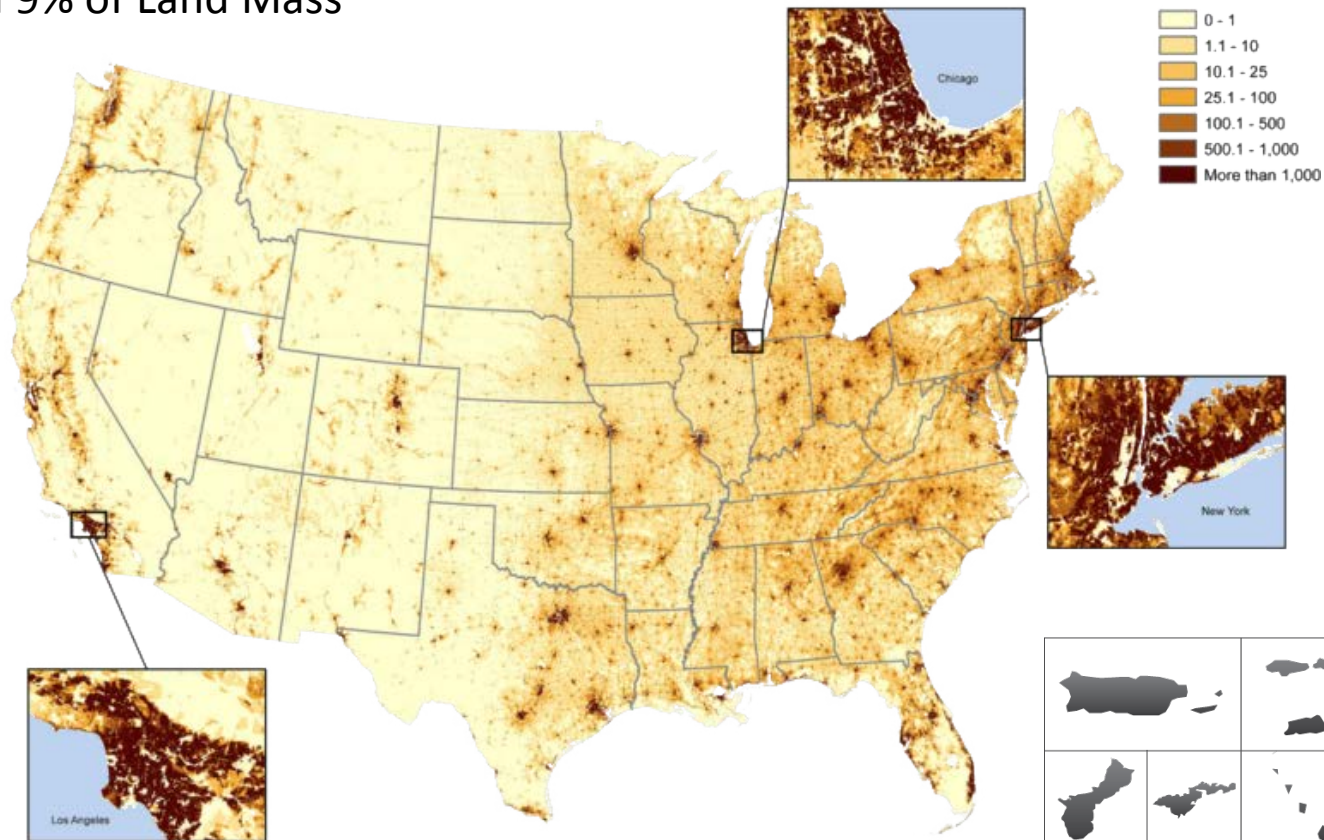


Legend

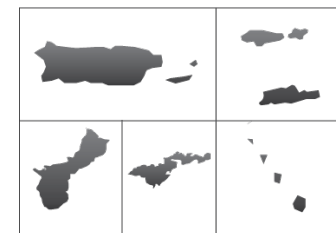
 Open Water	 Deciduous Forest	 Moss
 Perennial Ice/Snow	 Evergreen Forest	 Pasture Hay
 Developed, Open Space	 Mixed Forest	 Cultivated Crops
 Developed, Low Intensity	 Dwarf Scrub	 Woody Wetlands
 Developed, Medium Intensity	 Shrub\Scrub	 Emergent Herbaceous Wetlands
 Developed, High Intensity	 Grassland	
 Barren Land	 Sedge	

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



Population data for Alaska and Hawaii not immediately available



Population data for U.S. territories not immediately available

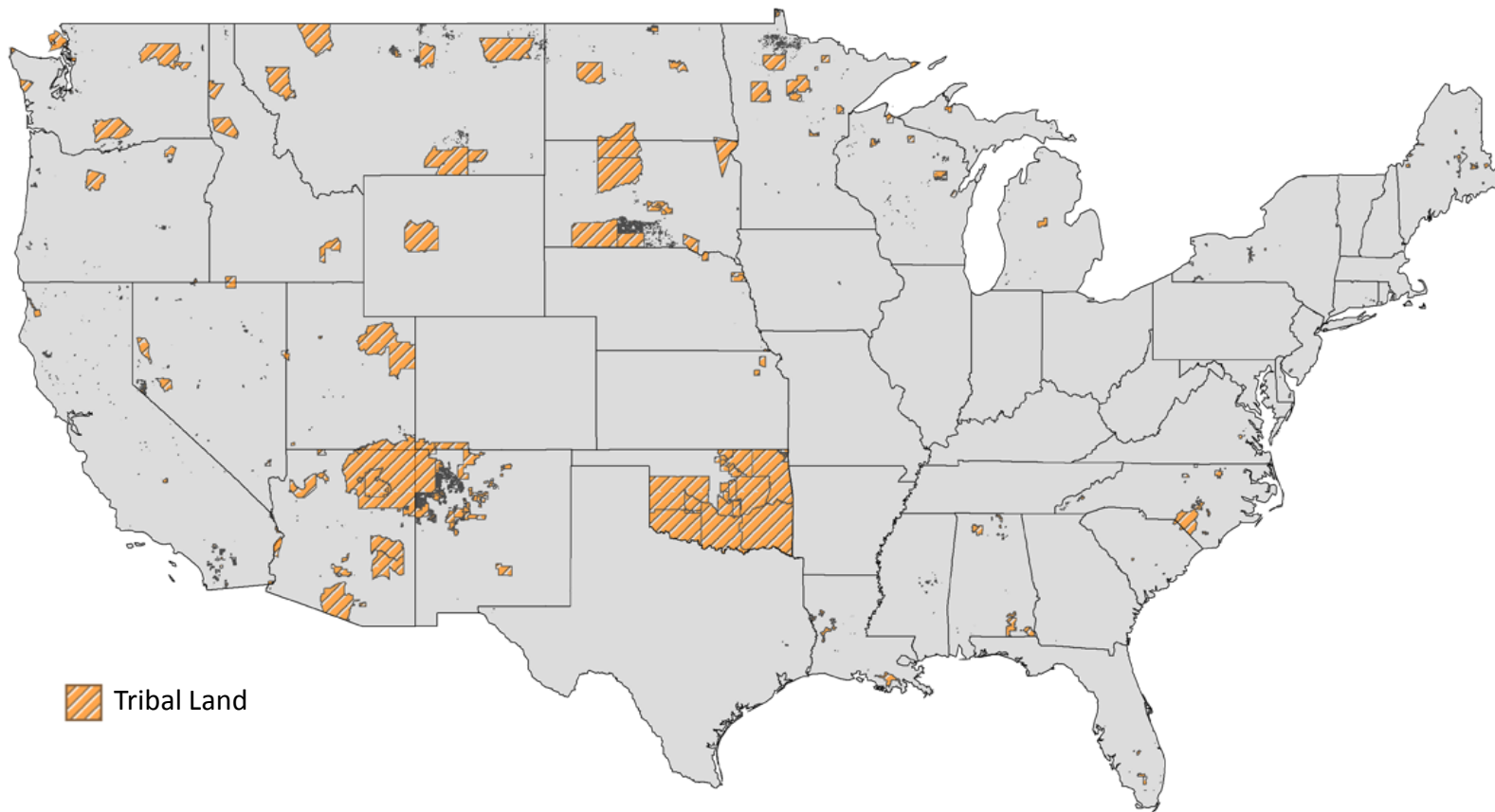
Our nation's roads and highways are used extensively by first responders.



Highway data for U.S. territories not immediately available

National Highway System: as Defined by the Federal Highway Administration

FirstNet has a mandate to provide rural coverage which includes tribal lands.



FirstNet coverage considerations go far beyond those of commercial networks.

Public Safety Factors

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

RELIABILITY



The majority of cell site outages are due to loss of power and data links.



Public safety-grade design includes:

- Extended battery life
- Back-up power systems
- Diverse cell site links
- Diverse cell site link technology (fiber, coax, microwave, telco)

A redundant and diverse network is essential for reliability.



REDUNDANCY

PHYSICAL

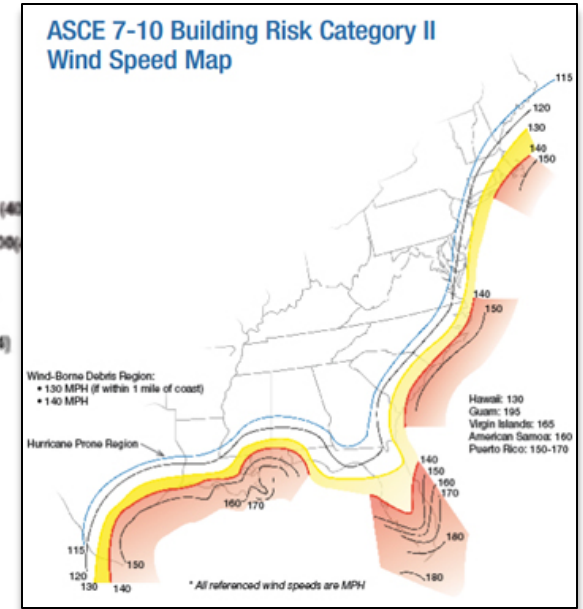
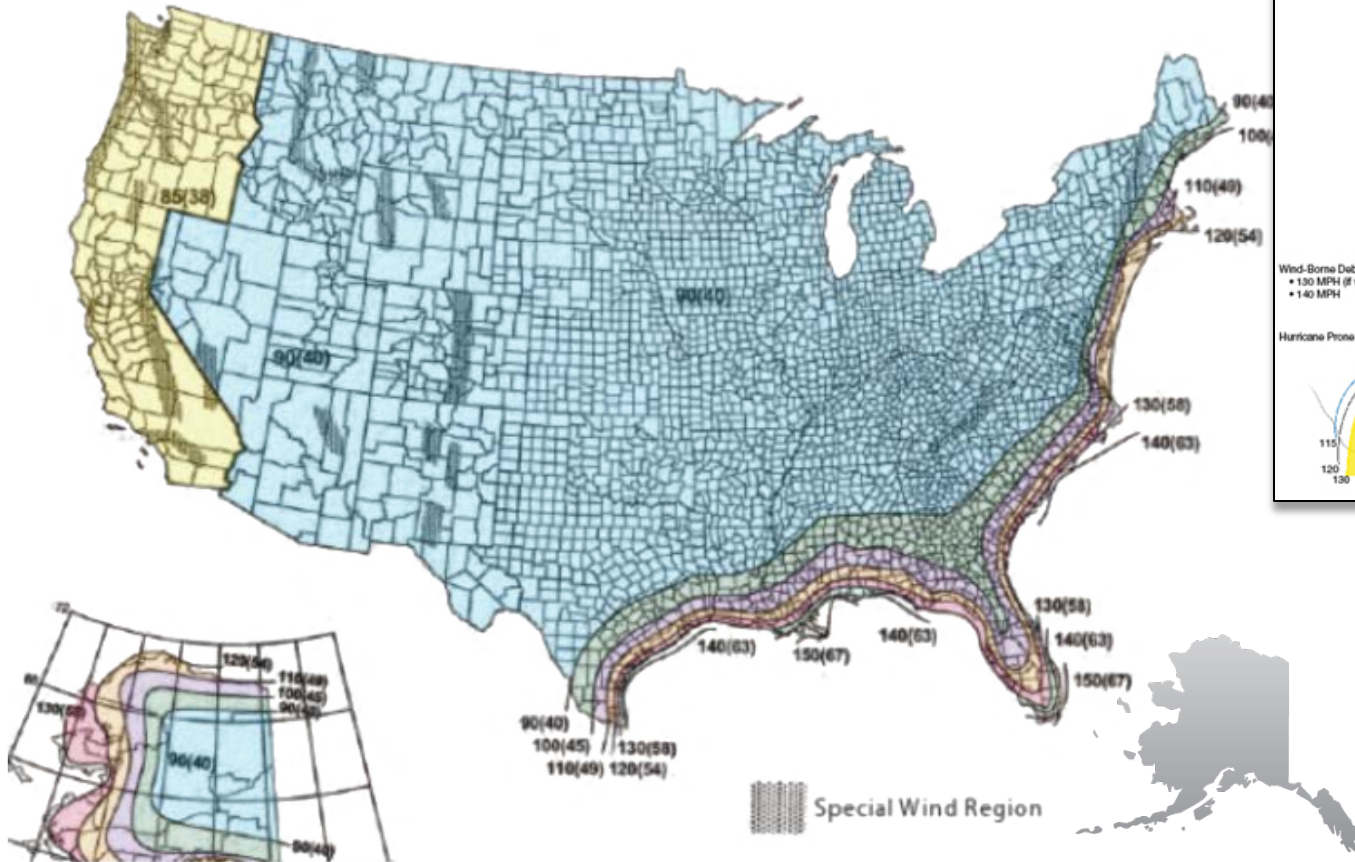
Avoiding single points of failure across the network (power, backhaul, sites, coverage)

OPERATIONAL

- Backup equipment
- Deployables
- Commercial carrier roaming/direct mode

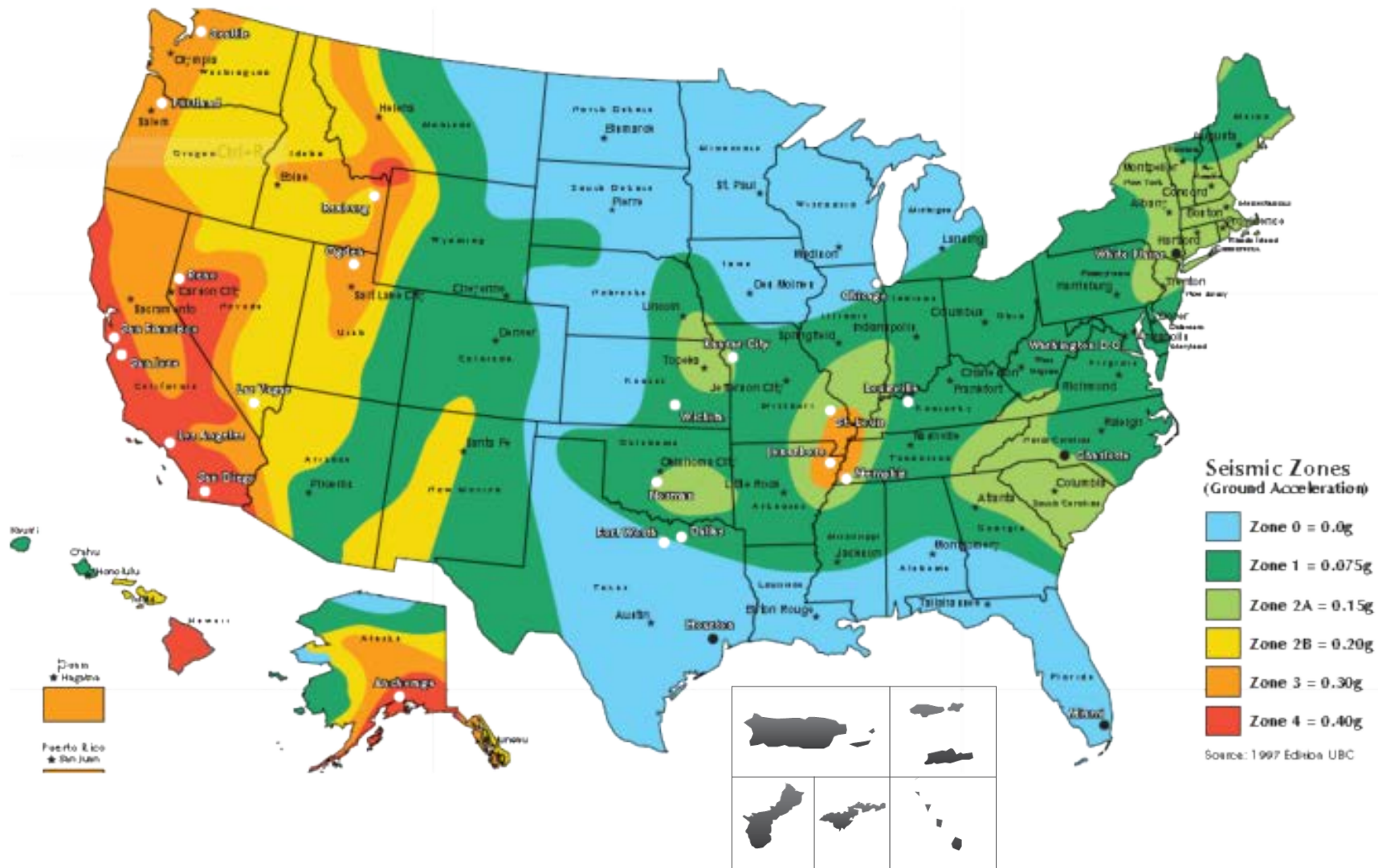
Wind zones will require more robust hardening...

REV G 3-SECOND BASIC WIND SPEED MAP



Wind speed data for Alaska, Hawaii, and U.S. territories not immediately available

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



Seismic data for U.S. territories
not immediately available

RESILIENCY



Recovering quickly after an network incident is imperative.

RESILIENCY

PHYSICAL

- Diverse Routing- Switching and Backhaul
- Mirrored Databases
- Geographically Distributed Processing

OPERATIONAL

- Deployables
 - Cells on Wheels
 - Systems on Wheels
- Capacity Management/Load Shifting
- Spares Management



DEVICES

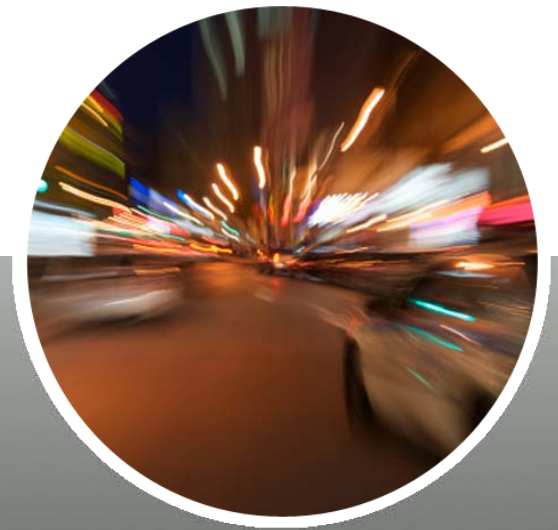


FirstNet devices will be designed to meet public safety requirements and support critical application and service needs.



An RFI was issued for devices on April 15, 2013.
These are device type examples for illustration only.

PROJECT PHASES



Phase I

Requirements
Planning

Phase II

Stakeholder
Decisions

Phase III

Contracts &
Core Network
Completion

Phase IV

Deployment
& Operations

Phase I

**Requirements
Planning**

Phase II

**Stakeholder
Decisions**

SLIGP Phase 1 – Requirements Gathering



SLIGP Phase 2 - Data Collection

User and Network Requirements



Core and RAN specifications

Network RFIs issued



Network RFPs issued

BTOP Spectrum Leases



**Pilot Project integration and device
planning**

Initial design concepts documented



FirstNet business model



**State RAN plan build-out documents
issued**

Phase III

Requirements
Planning

Stakeholder
Decisions

Contracts &
Core Network
Completion

Deployment
& Operations

- **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**

FIRSTNET IS COMMITTED TO...

- **Creating a nationwide architecture and standards with local management and adaptation.**
- **Optimizing the use of existing wireless facilities to reduce network spend.**
- **Building relationships with all 56 states and territories.**
- **Working together based on your requirements**
- **Deploying a fully-integrated public safety-grade nationwide wireless broadband network serving first responders and public safety for decades to come.**

Please join us in this mission.



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.



Q & A

