



FirstNet[®]



Initial Consultation Meeting

Working together to bring broadband to Public Safety Entities



October 28, 2015
Oklahoma City, Oklahoma

Welcome & Introductions



Initial Consultation Goals



**Strengthen
Our
Relationship**



**Provide
FirstNet
Updates**



**Learn about
Unique
Needs of
Oklahoma**



**Discuss
Next Steps**

Meeting Goals

Agenda – Initial Consultation



Time	Agenda Item	
9:00	Welcoming Remarks	Bo Reese – Oklahoma Ben Gherezgiher – Oklahoma Jeremy Zollo – FirstNet
9:30	FirstNet Update and Consultation Process	Jeremy Zollo – FirstNet
11:00	Break (<i>Group Picture</i>)	
11:15	State Project Status Presentations	Ben Gherezgiher – Oklahoma David Fein – Oklahoma
12:00	Lunch (Buffet)	
	<ul style="list-style-type: none"> Oklahoma Memorial Video Presentation Finding Timothy McVeigh 	Sheriff Charlie Hanger – Oklahoma
1:15	Oklahoma Use Cases	
	<ul style="list-style-type: none"> City of Moore, Tornado Presentation Tribal Presentation Wildland Fires in Oklahoma Rural Emergency Medical Law Enforcement 	John Comstock – Oklahoma Randy Wesley – Chickasaw Tribal Mark Goeller – Oklahoma Ray Simpson – Oklahoma Sheriff Joe Lester – Oklahoma
2:30	Break	
2:45	Data Collection Elements Discussion: Coverage, Users/Operations, Capacity, Current Service	Brian Kassa – FirstNet
	Oklahoma Data Collection Activities	Oklahoma
4:00	Question and Answer Panel Session	Oklahoma & FirstNet
5:00	Adjourn	

First Responder Communications



Non-Mission Critical

The Current State

Mission Critical



Commercial LTE Service / Devices



Data

Voice

Land Mobile Radio (LMR) for Public Safety



Voice

First Responder Communications



Non-Mission Critical

The Near-Term Vision

Mission Critical

FirstNet will ensure that emergency responders are provided with the first nationwide, high-speed, wireless broadband network dedicated to public safety

 **FirstNet** LTE Service / Devices

Congestion

Coverage

Outages

Data **Voice**

Land Mobile Radio (LMR) for Public Safety



Voice

FirstNet Network Benefits



**Dedicated to
Public Safety**



**Public Safety
Apps /
Services**

**QoS, Priority
& Preemption
(QPP)**



**Situational
Awareness**

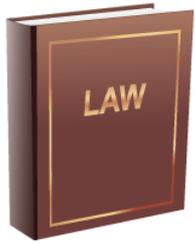


**Local
Control**



**Public Safety
Grade**

Implementing the Vision



THE LAW

2.22.12

FirstNet becomes law
PL 112-96

GOVERNANCE



The FirstNet Board has **15** members, including those with telecommunications and public safety backgrounds.

Each Governor appoints **1** Single Point of Contact (SPOC) and governing body to represent the State's interests to FirstNet.

42 member Public Safety Advisory Committee (PSAC) advises FirstNet on public safety intergovernmental matters.



FUNDING



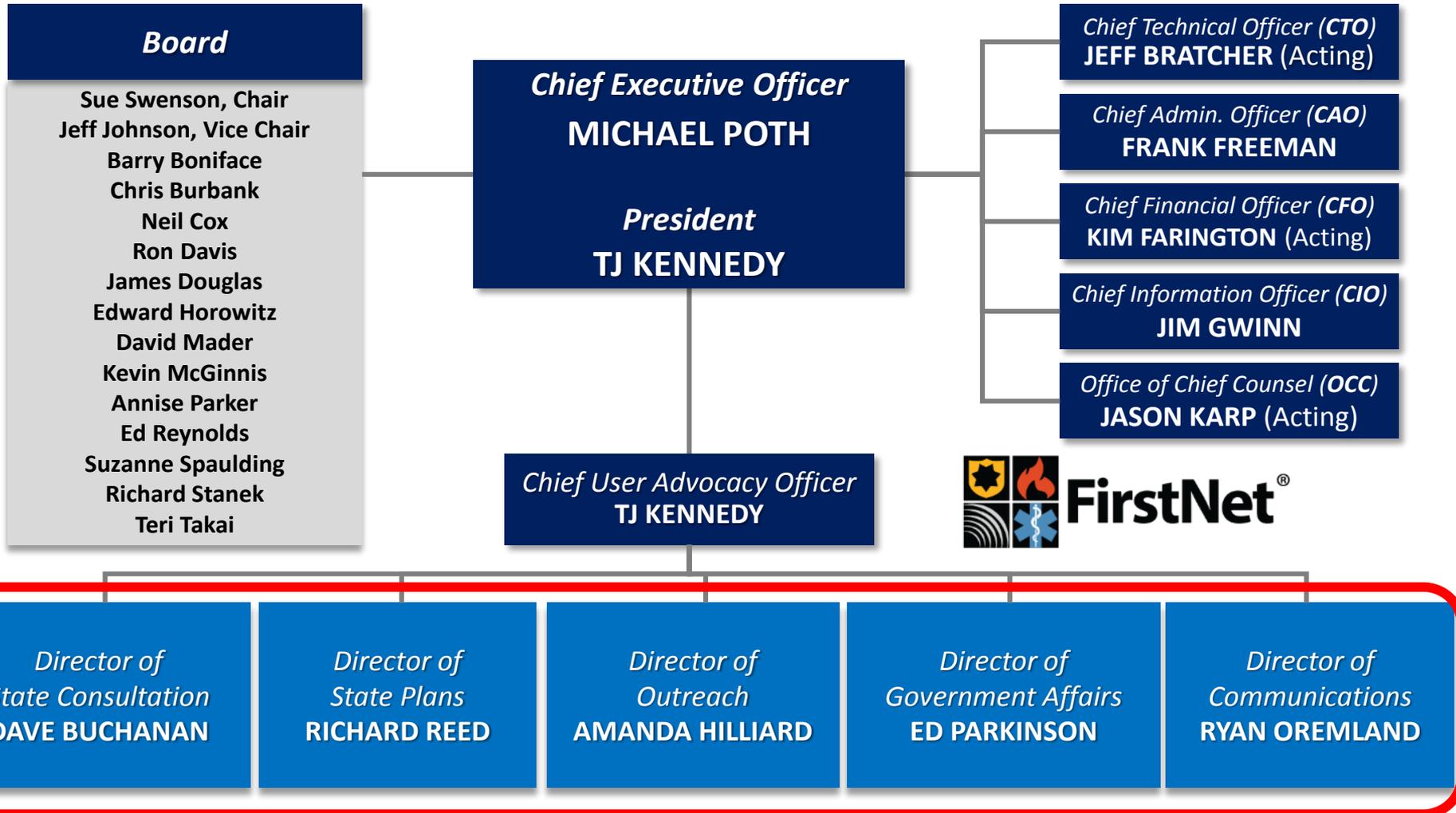
\$7B authorized to build the FirstNet network. Funded by spectrum auctions through 2022.

BAND CLASS (BC) 14

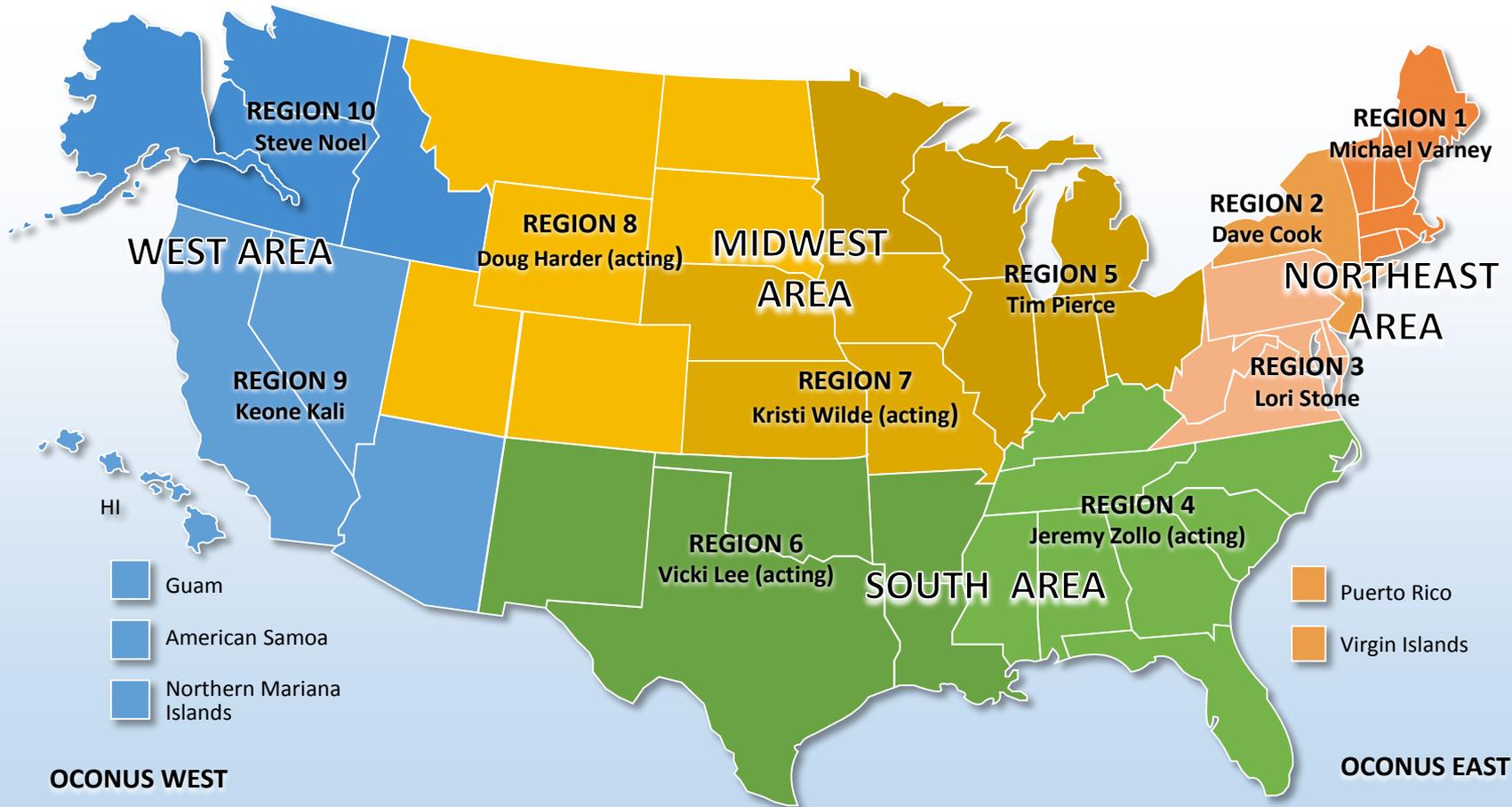
20MHz of bandwidth has been dedicated to public safety in the prime upper **700MHz** frequency range.

BC 17		BC 17		BC 13		BC 14		BC 13		BC 14	
BC 12	BC 29	BC 12	BC 13	BC 14	LMR	BC 13	BC 14	LMR	BC 13	BC 14	LMR
T-Mobile AT&T	AT&T Dish	T-Mobile AT&T	Verizon	Broadband PS FirstNet	PS Narrowband	Verizon	Broadband PS FirstNet	PS Narrowband	Verizon	Broadband PS FirstNet	PS Narrowband
UL	DOWNLINK	DL	DOWNLINK	DOWNLINK		UPLINK	UPLINK		UPLINK	UPLINK	
6 MHz	12 MHz	6 MHz	12 MHz	11 MHz		11 MHz	10 MHz		11 MHz	10 MHz	6 MHz
↑ 1 MHz Guard Bands											

FirstNet Organization



User Advocacy Regional Staffing Update



Consultation & State Plan Process



Need Inputs to Get Answers



Plan Options



Training

Data Usage



Users

FirstNet Consultation

Deployables



Hardening



Security



Coverage Objectives



Devices

Applications



Core Network

Prioritization

Self-Sustaining Network

\$7B



Excess Capacity Revenue

Fees

Deployment Costs

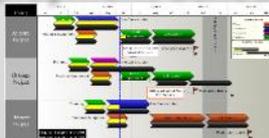
Operations & Maintenance Costs

PS Features

Priority, Security, Hardening, etc.



Deployment Schedule



Core Design



Cost Estimates

Baseline Coverage



Excess Capacity Valuation

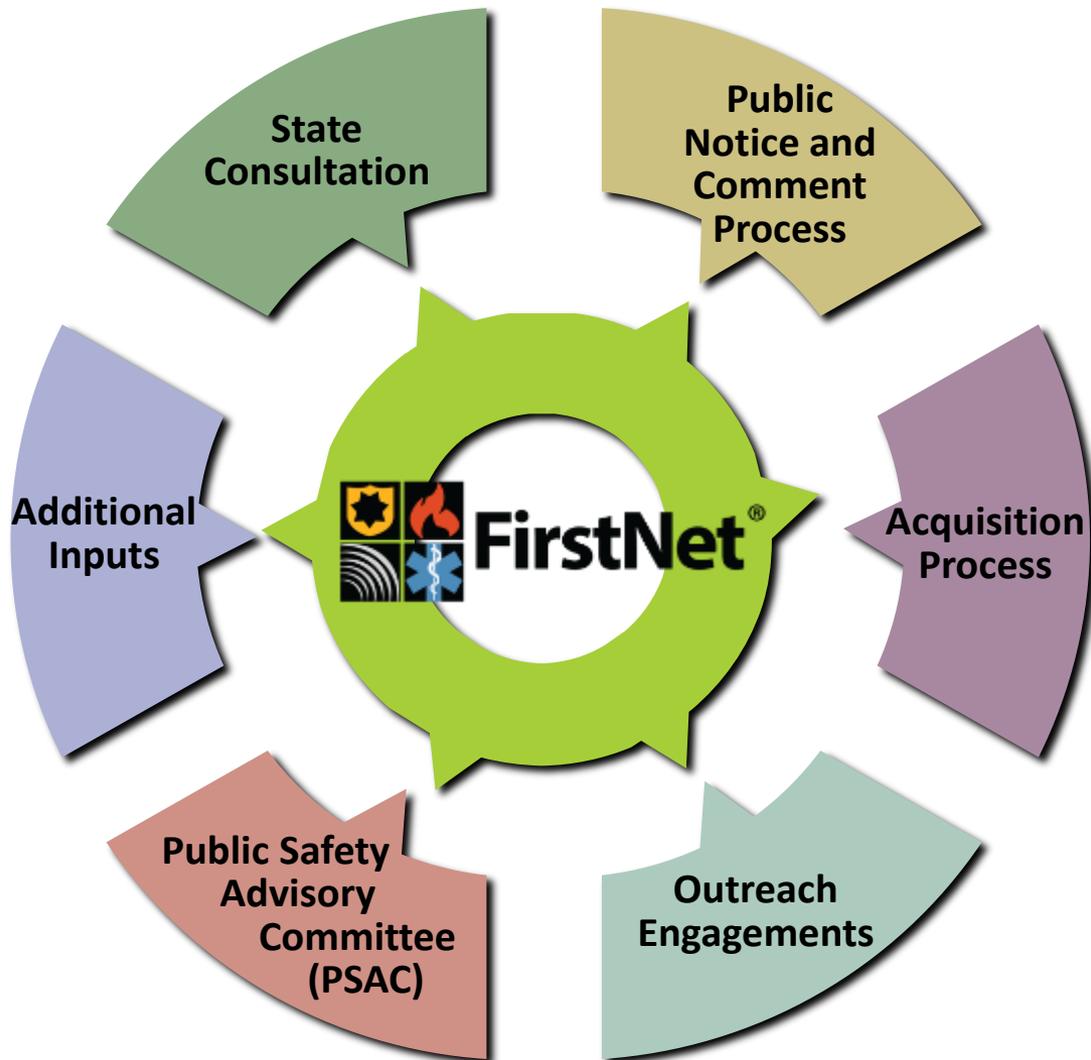


Hardening Costs

Available Devices

FirstNet Acquisition

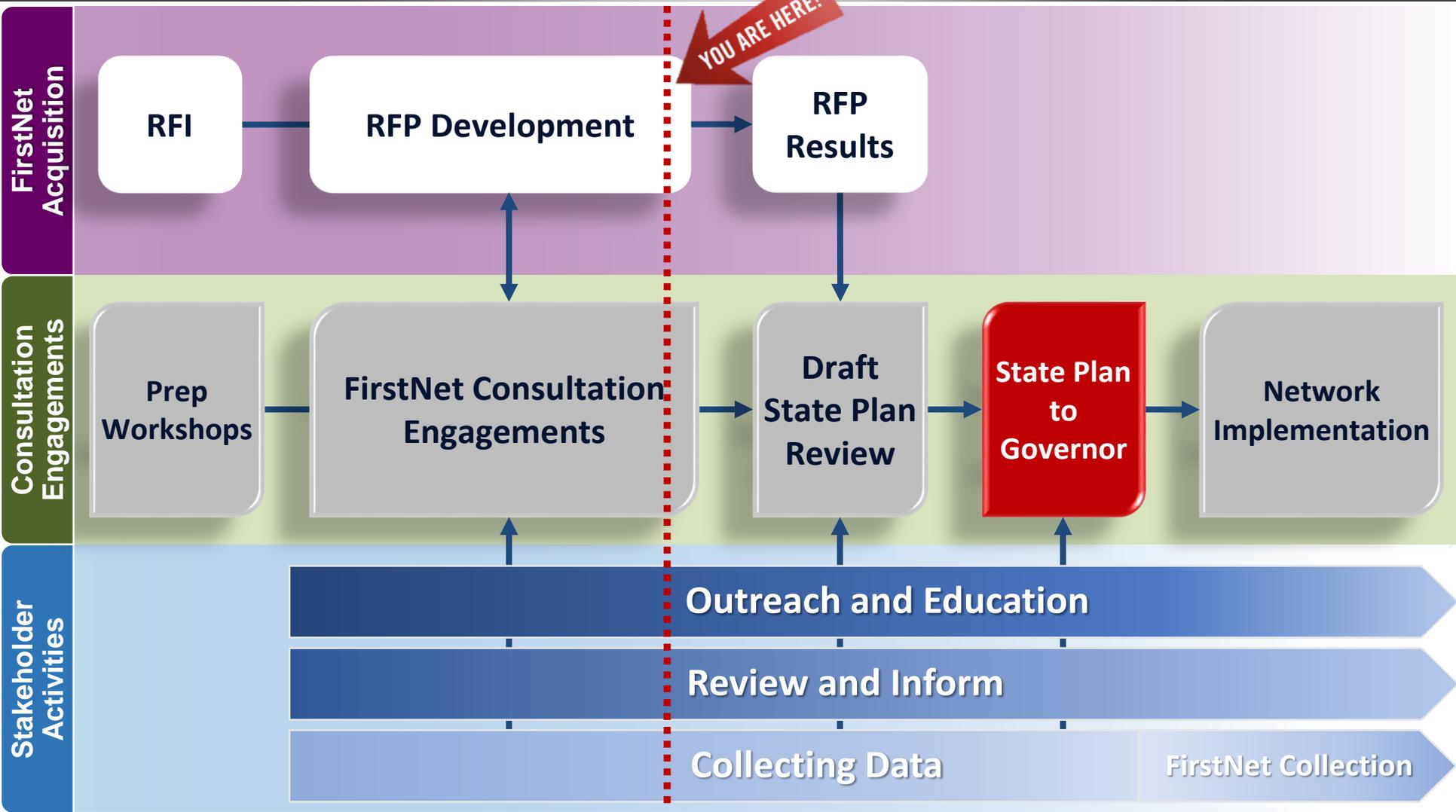
Adoption Estimates



State Consultation

1. Construction of a Core and RAN build out
2. Placement of towers
3. Coverage areas of the network
4. Adequacy of hardening, security, reliability, and resiliency
5. Assignment of priority to local users
6. Assignment of priority and selection of entities seeking access to or use of the network
7. Training needs of local users

State Plan Development Process



What is a State Plan?



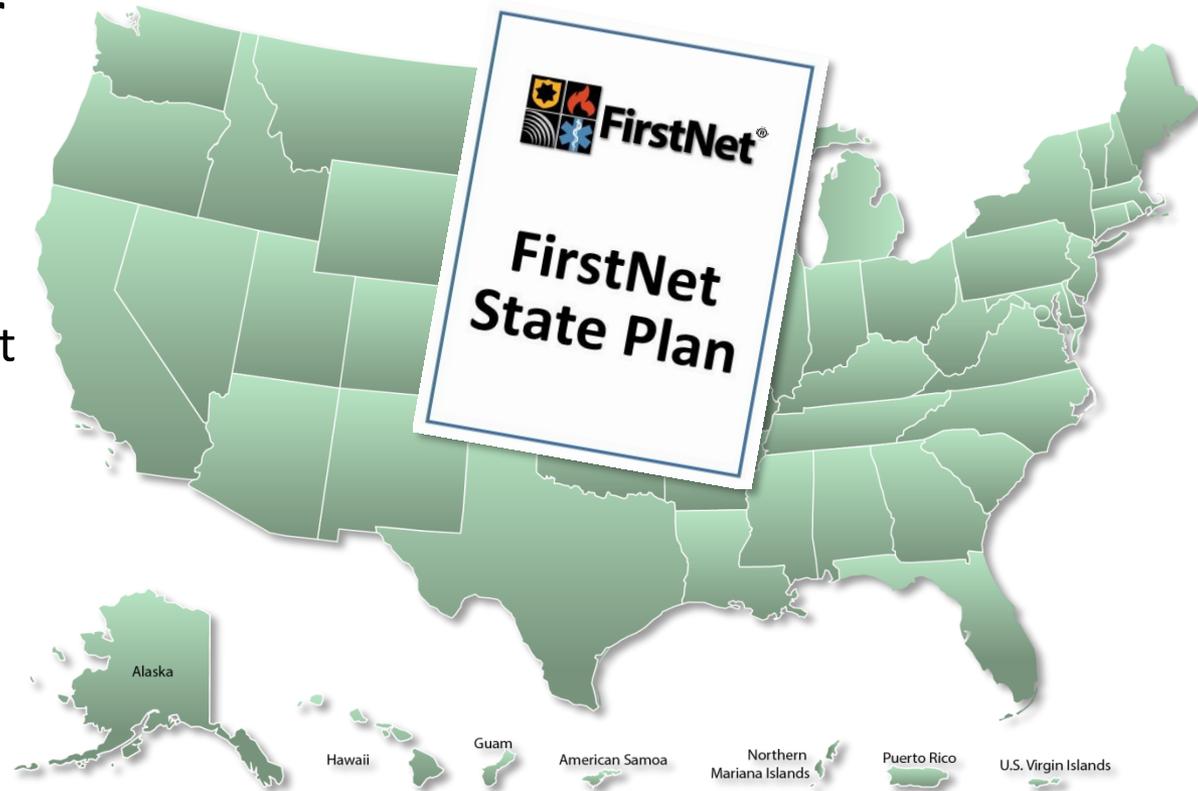
- Contains the Information the Act Requires**
- Contains the Information the State Desires**
- Captures a Snap Shot in Time**
- Allows the Governor to Make an Informed Decision on the FirstNet Value**
- Is a Non-Binding Document**
- Is Implementable and Affordable**
- Supports the FCC and NTIA in Evaluation of a State's Alternative RAN Plan**

State Plan Process



Under the Act, the Governor has 90 days to choose whether to

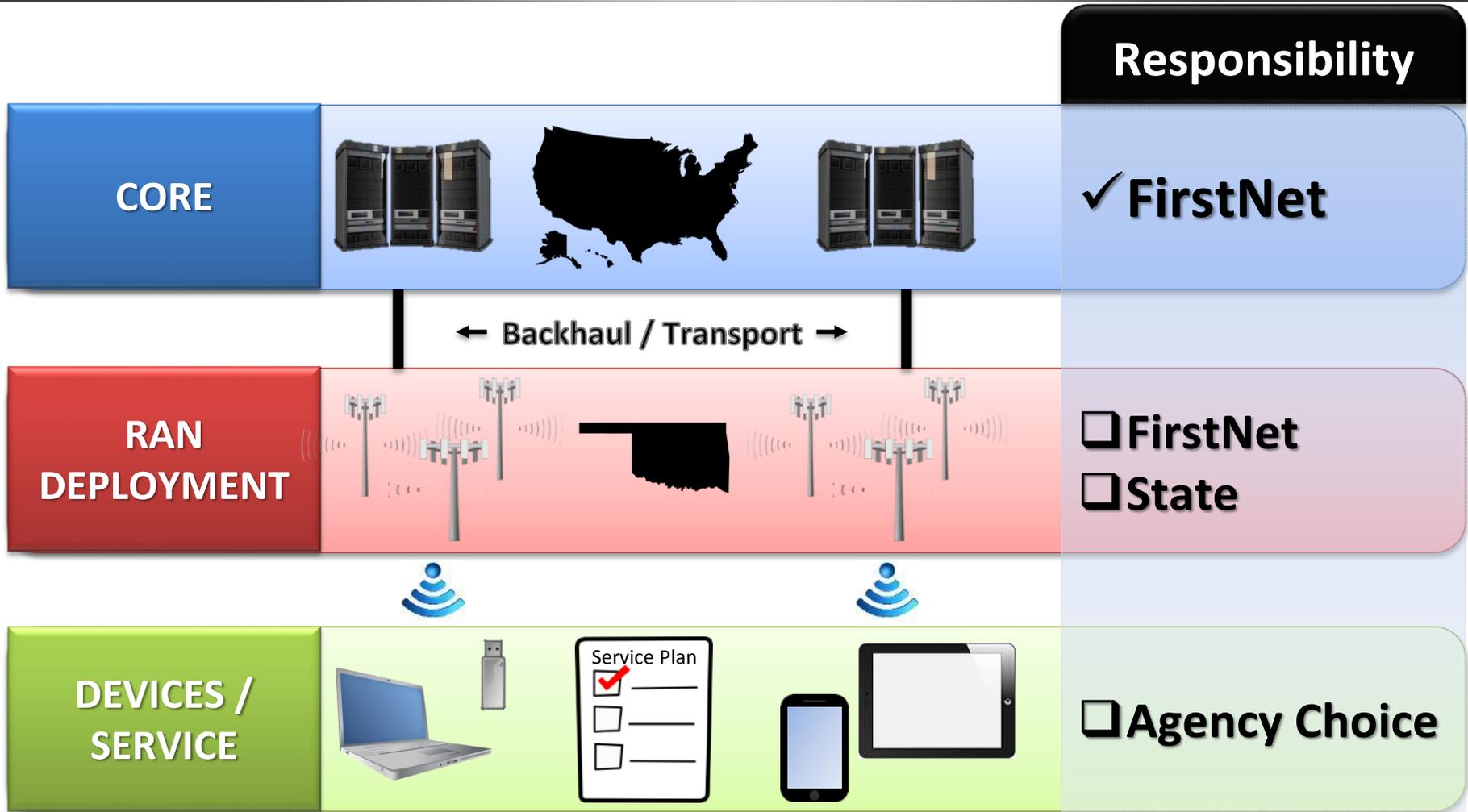
1. Participate in the FirstNet proposed radio access network (RAN) deployment or
2. Assume responsibility to conduct its own state RAN deployment



Designing a Nationwide Network



Responsibilities for Network Components



Leveraging an Evolving Landscape



Aggregate LTE Coverage 3Q 2014

Network Intelligence Provided By

All coverage illustrated is derived from public information provided by terrestrial mobile operators. Not all operators choose to market coverage information. Standards for coverage representation vary among operators. Mosaik Solutions provides no warranty to the accuracy of the data. Analysis reflects 2010 U.S. Census Data.

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PUBLIC SAFETY NEEDS

- ✓ Dedicated Spectrum
- ✓ Priority / Preemption
- ✓ Public Safety Grade
- ✓ Cybersecurity
- ✓ Public Safety Applications

LEVERAGING INDUSTRY

- ✓ Existing Infrastructure
- ✓ Built & Maintained
- ✓ Global Standard
- ✓ Interoperability
- ✓ Economy of Scale

Why Leverage Industry?

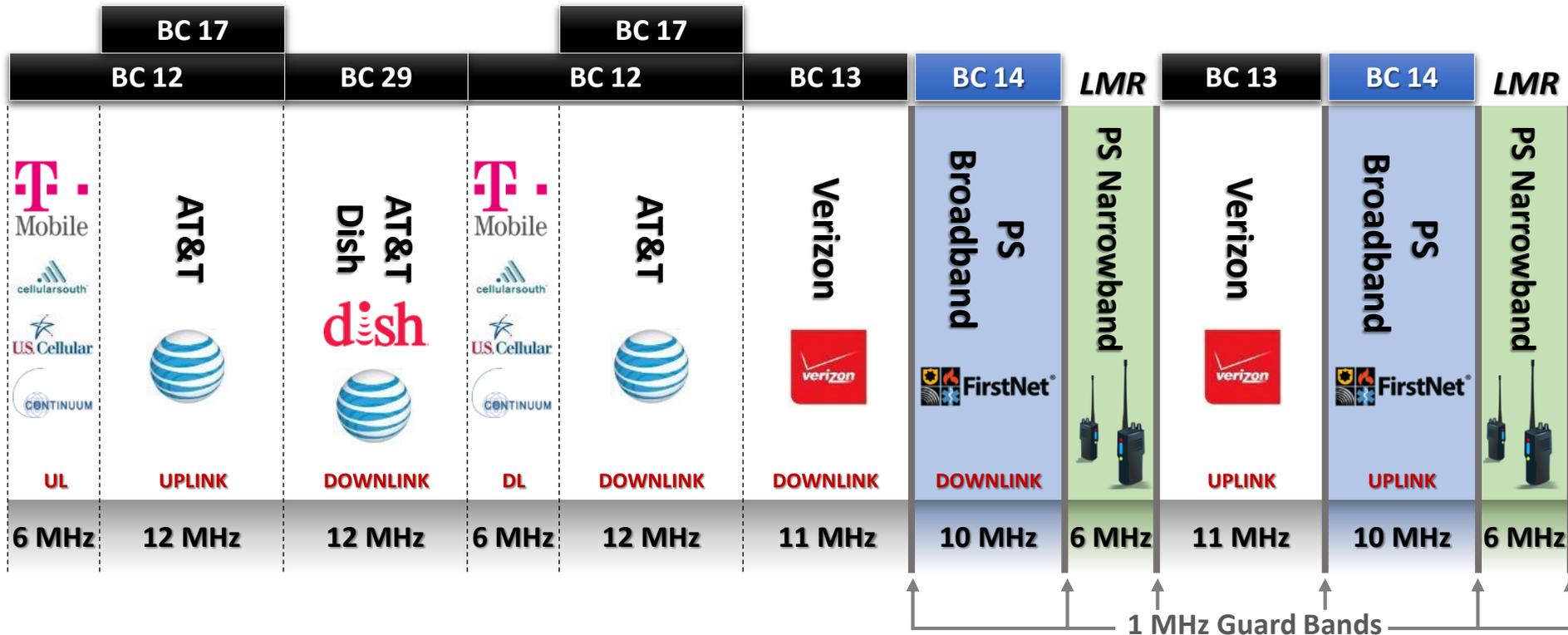
- Follow the marketplace to leverage economies of scale and keep costs low
- Commercial service providers lease sites from large tower companies
 - Site Management is their business
 - Tools and services in place for site acquisition
 - Some own 10,000s of sites
- An LTE RAN site has high demands
 - Multiple, large antennas
 - High bandwidth connectivity requirements
- RAN share options are attractive to share costs and speed deployment times
- Public Safety Grade requirements will be addressed when economically feasible and allowed by law



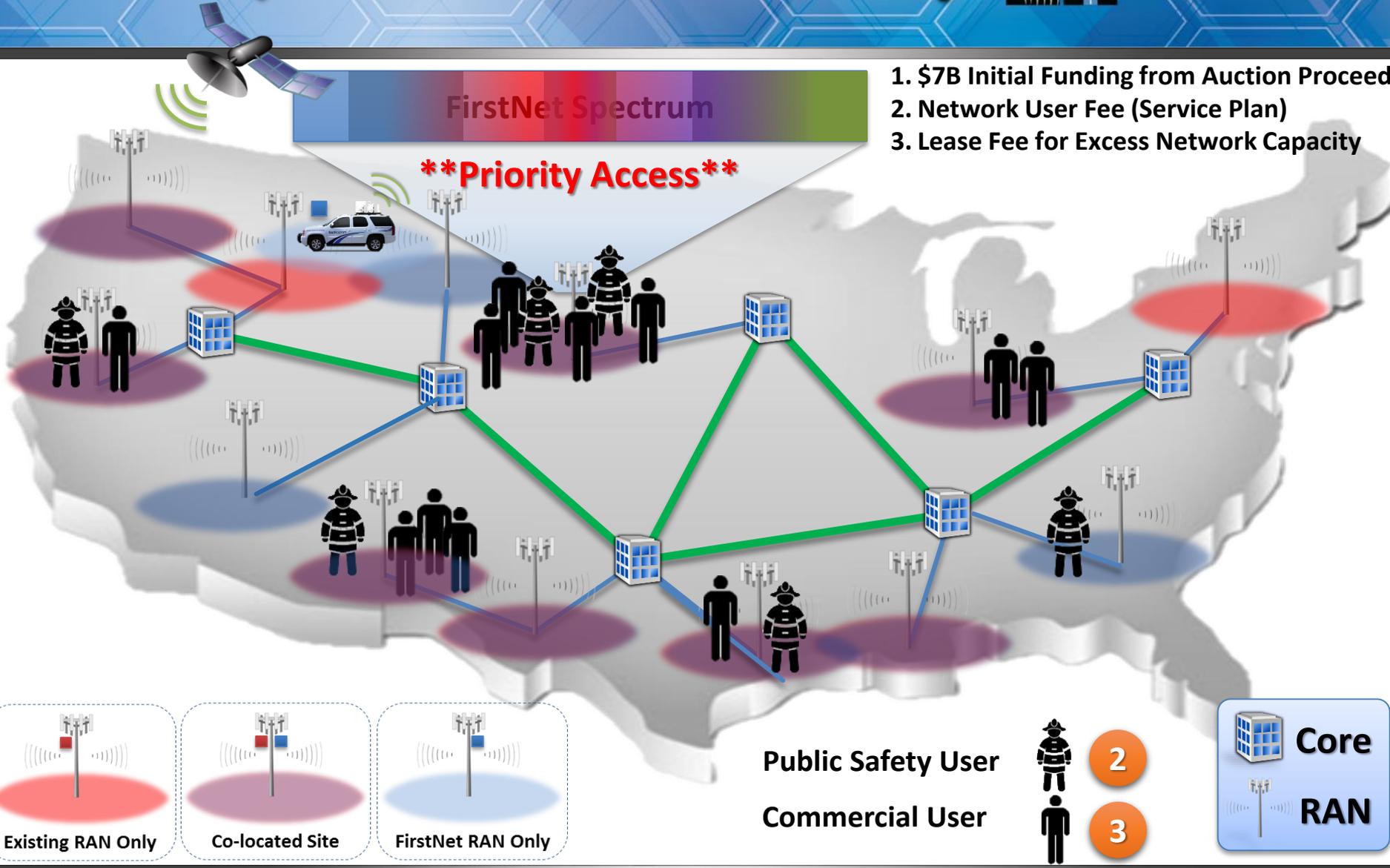
FirstNet Spectrum – A Valuable Resource



- FirstNet is the license holder for Public Safety's Broadband allocation – **Band Class (BC) 14**
- Commercial Carriers also operate in several bands outside of 700 MHz



Revenue, Architecture & Priority



Quality of Service Priority and Preemption “In Real Life”



QoS Demonstration – 100 Users

High Priority
QCI 6

Normal Priority
QCI 9



# of Users	Throughput per user	Video Quality QCI 6	Video Quality QCI 9
100	0.5 Mb (low rate streaming)	Good	Good



QoS Demonstration – 140 Users

High Priority
QCI 6



Normal Priority
QCI 9



# of Users	Throughput per user	Video Quality QCI 6	Video Quality QCI 9
140	0.5 Mb (low rate streaming)	Good	Pixelation



QoS Demonstration – 200 Users

High Priority
QCI 6



Normal Priority
QCI 9



# of Users	Throughput per user	Video Quality QCI 6	Video Quality QCI 9
200	0.5 Mb (low rate streaming)	Good	Not Viewable



200 Users with QCI Modification

High Priority
QCI 6



Normal Priority
QCI 9



# of Users	Throughput per user	Video Quality QCI 9 -> QCI 6	Video Quality QCI 9
200	0.5 Mb (low rate streaming)	Not Viewable -> Good	Not Viewable



Quality of Service Priority and Preemption Framework



Network Status

Three Network States



Static



Dynamic



Controlled



Covered Leasing Agreement Users



Three CLA User States



Free Range



Restricted



Preempted



Emergency/Non-Emergency User States



Immediate Peril



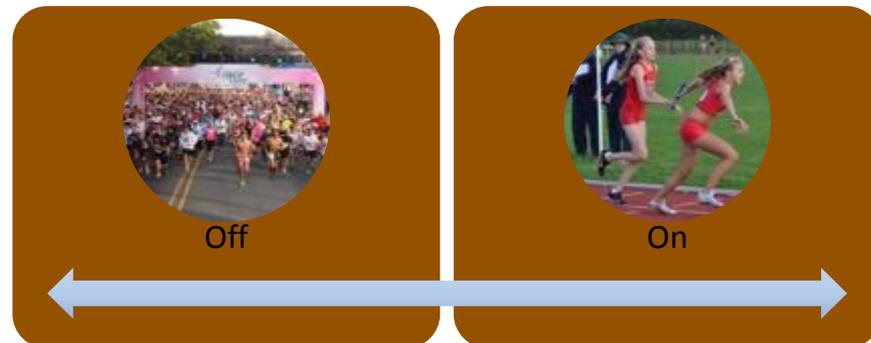
NPSTC U7

Responder Emergency



NPSTC U6

Relayed Users



Primary User Type

NPSTC U1

- Type of User: Discipline, Priority, Network Access, Network Admission, Scheduling Priority
- Source: Provisioned Data

User Default Role

NPSTC U3

- Default Leadership or Functional Role
- Source: Provisioned Data

User Location

NPSTC U4

- User Device Relative Location
- Source: Network

User Operational Status

NPSTC U5

- Assigned to an Incident identified by a Unique Incident Identifier or Not Assigned
- Source: API, CAD or App by Public Safety

Incident Role

NPSTC U9

- Incident Role for an Incident Identified by a Unique Incident Identifier or No Role
- Source: API, CAD or App by Public Safety

Incident Identifier

- Unique Incident Identifier used to tie users and incident together
- Source: Network Assigned

Incident Location

- Point Location or Geo-fence location for an Incident
- Source: API, CAD or App by Public Safety

Incident Severity

- The severity of an incident
- Source: API, CAD or App by Public Safety

NPSTC U8

Static Application Data:

Application Profile

NPSTC U2

NPSTC U10



Type

- Major Application Type: Incident Command, Voice, Messaging, 911, Applications, Machine-to-Machine, Video, Responder Safety and Off-Net

Usage Scenario

- One of approximately 40 Predefined usage scenarios

Priority

- Priority Value for the application: High – Medium - Low

Quality

- Quality of Service (delay tolerance) for the Application: High - Medium - Low

Preemption

- Whether the Application can Preempt or be Preempted: Can Preempt - Can Be Preempted

Frequency of Use

- Expected frequency of use for the Application: Usage per Hour

Expected Bandwidth

- Expected or required bandwidth for the Application: in Kilobits per second

Source: At time of Agency onboarding to FirstNet, Agency accepts Default Values or configures their own agency specific data through local control.

Static Application Data: Operational Profile – ~10 Profiles per Agency



Operational Profile 1: “In Station”

- Type - Usage Scenario A – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario B – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario C – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario D – Priority – Quality – Preemption – Frequency - Bandwidth

Operational Profile 2: “Single Family Structure Fire”

- Type - Usage Scenario A – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario E – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario R – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario T – Priority – Quality – Preemption – Frequency - Bandwidth

Operational Profile 10: “Wildland Fire”

- Type - Usage Scenario U – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario X – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario Y – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario Z – Priority – Quality – Preemption – Frequency - Bandwidth

Responder Emergency

- Type - Usage Scenario U – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario X – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario Y – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario Z – Priority – Quality – Preemption – Frequency - Bandwidth

Immediate Peril

- Type - Usage Scenario U – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario X – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario Y – Priority – Quality – Preemption – Frequency - Bandwidth
- Type - Usage Scenario Z – Priority – Quality – Preemption – Frequency - Bandwidth

Source: At time of Agency onboarding to FirstNet, Agency accepts Default Values or configures their own agency specific data through local control

Operational Profile 2: “Single Family Structure Fire”

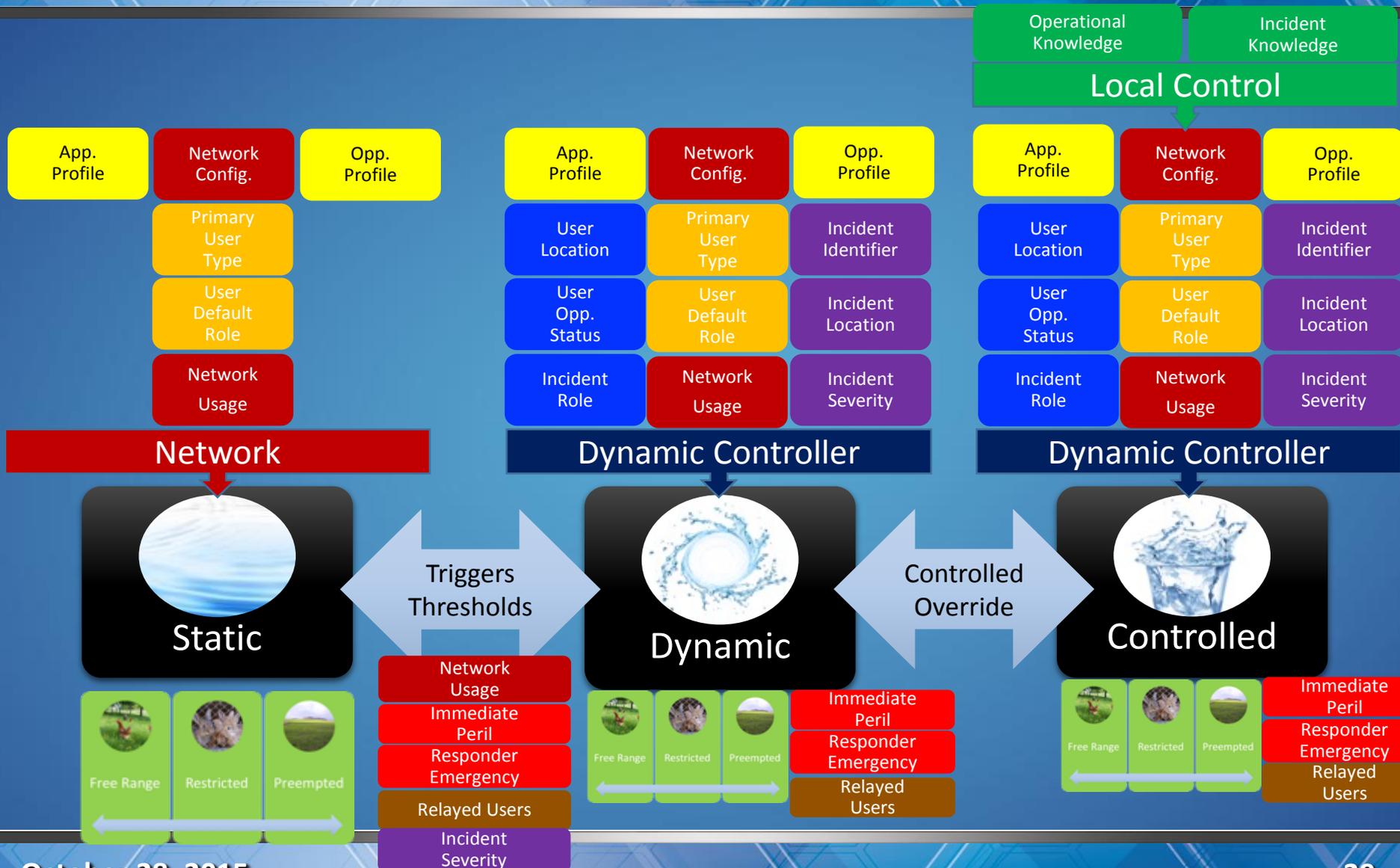
- Type: Application – **Computer Aided Dispatch** – Priority High – Preemption High – Quality Medium – Frequency 5XHour – BW 64Kbps
- Type: Application – **Paging/Alerting** – Priority High – Preemption High – Quality Medium – Frequency 5XHour – BW 64Kbps
- Type: Application – **Situational Awareness** – Priority High – Preemption High – Quality High – Frequency Continuous – BW 10 Kbps
- Type: Application – **Basic Internet** – Priority Low – Preemption Vulnerable – Quality Low – Frequency 5XHour – BW 128Kbps
- Type: Responder Safety – **Human Telemetry** – Priority High – Preemption Can – Quality High – Frequency Continuous – BW 4Kbps
- Type: Application – **Fire Related** – Priority High – Preemption Vulnerable – Quality Medium – Frequency 5XHour – BW 64Kbps

Dynamic Application Data: Profile Selection - Set User X to Profile Y



Source: User default state is Profile 1. When user is assigned to an Incident through API, CAD or Application the users application profile can be set to another profile

QPP Framework



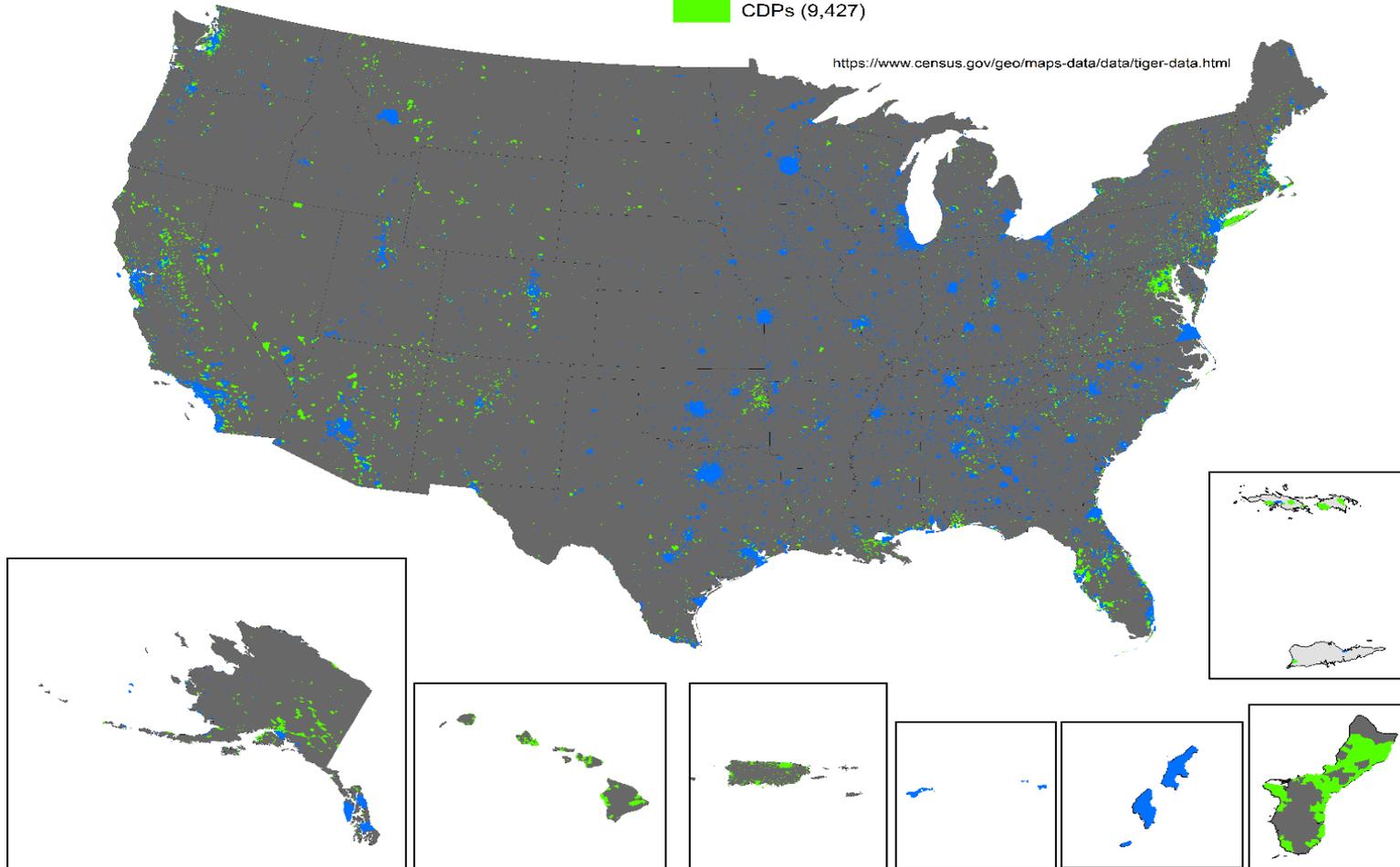
- Rural areas are ***any area other than:***
 - A city, town or incorporated area that has a population of greater than 20,000
 - Any urbanized area contiguous and adjacent to a city or town with greater than 50,000 inhabitants
- Need to define ***city, town or incorporated area and urbanized area***
 - US Census defines “places” as an incorporated place established to provide governmental functions for a concentration of people.
 - Usually a city, town, village, or borough but can have other legal descriptions
 - Also includes Census Designated Places (CDPs)
 - Source: http://www.census.gov/geo/reference/gtc/gtc_place.html#cdp
- US Census “Place” provided appropriate areas representing population centers with associated population counts in which to apply the above rules

Mapping the Results

All US Census Places

-  Incorporated Areas (cities, towns, villages, boroughs) (19,607)
-  CDPs (9,427)

<https://www.census.gov/geo/maps-data/data/tiger-data.html>



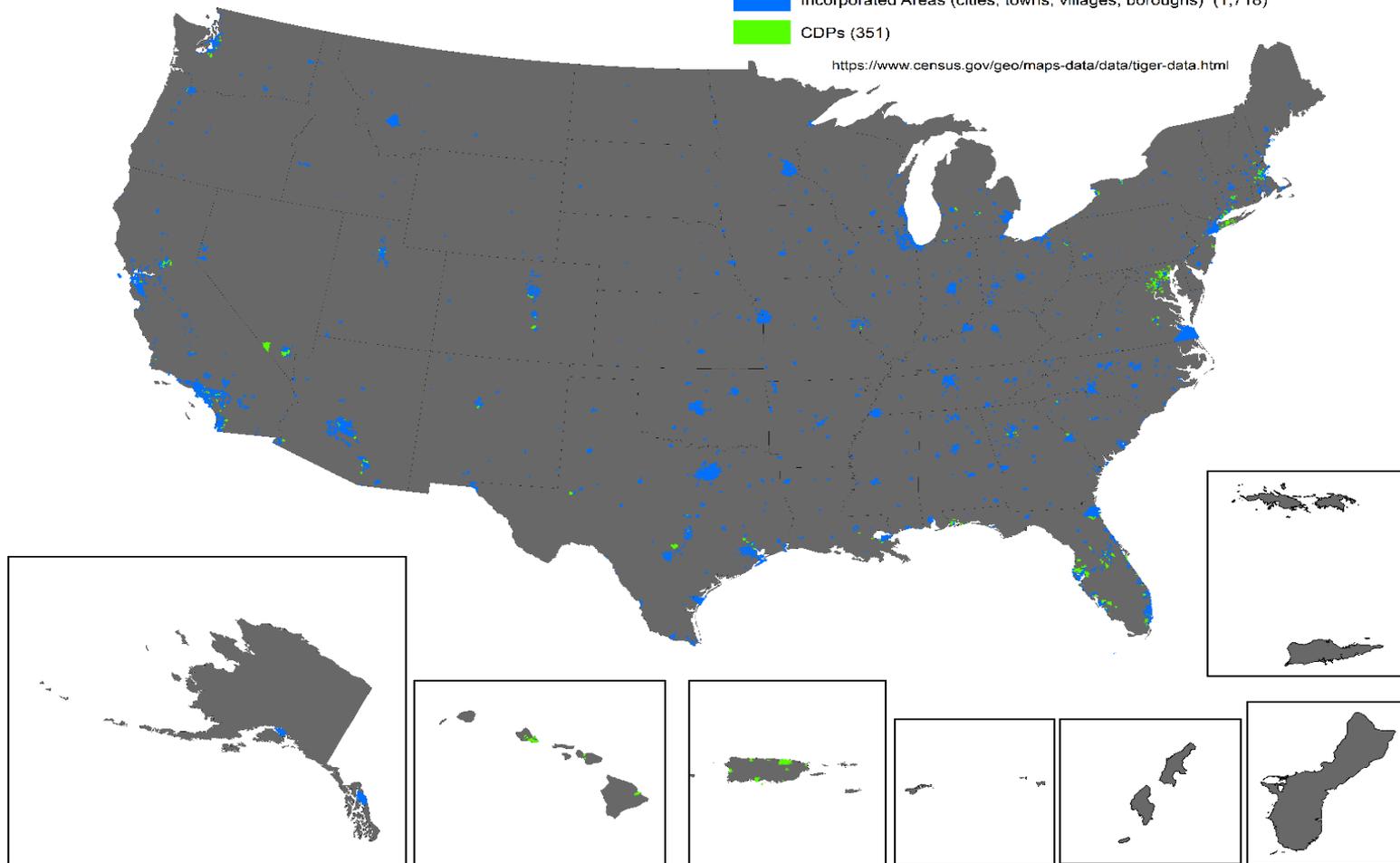
Mapping the Results

All US Census Places >20,000 People

US Census Places > 20,000 People

-  Incorporated Areas (cities, towns, villages, boroughs) (1,718)
-  CDPs (351)

<https://www.census.gov/geo/maps-data/data/tiger-data.html>



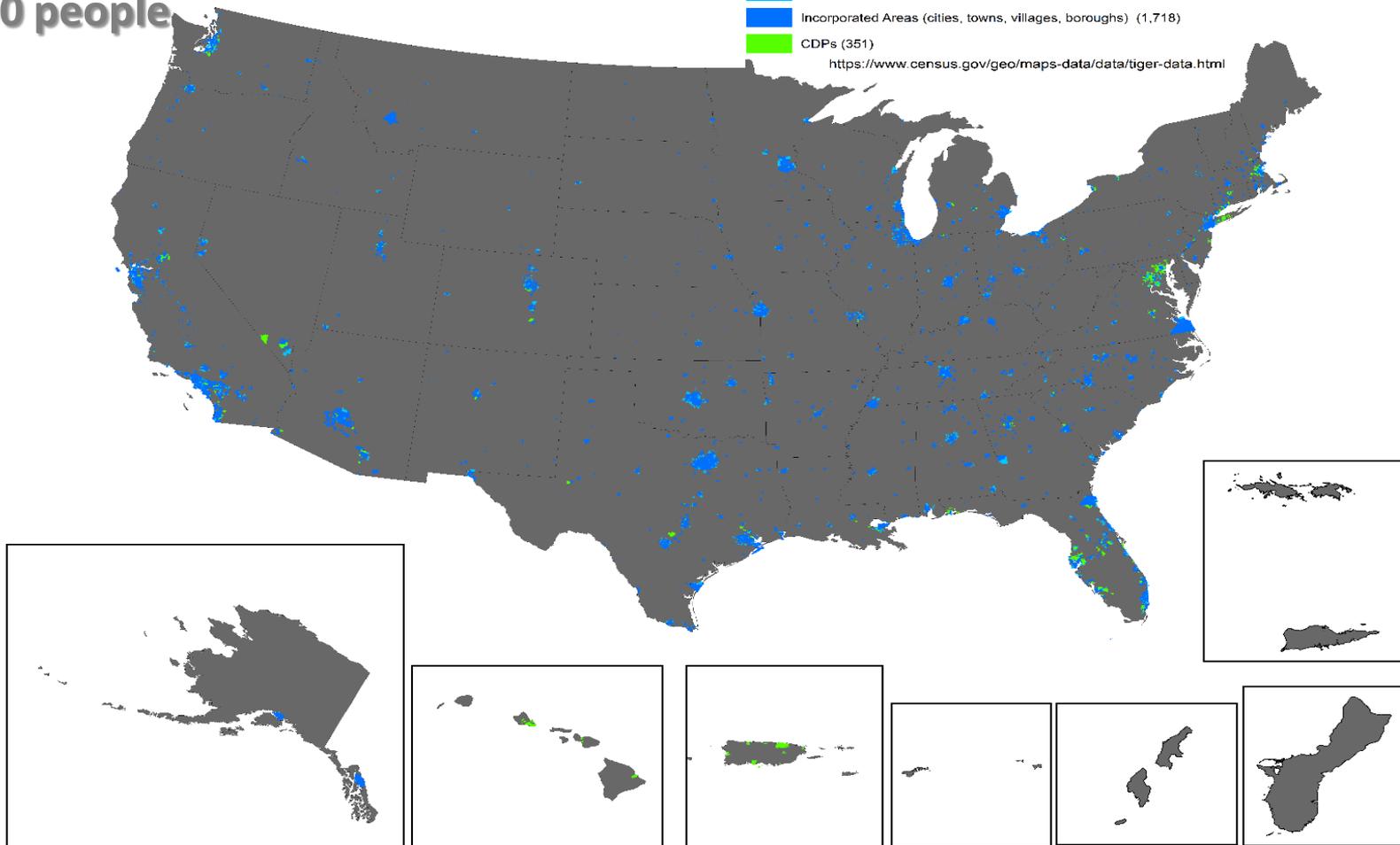
Mapping the Results

All US Census Places >20,000 & adjacent to >50,000 people

US Census Places > 20,000 and w/ contingency

- Adjacent Places < 20,000 (2,029)
- Incorporated Areas (cities, towns, villages, boroughs) (1,718)
- CDPs (351)

<https://www.census.gov/geo/maps-data/data/tiger-data.html>

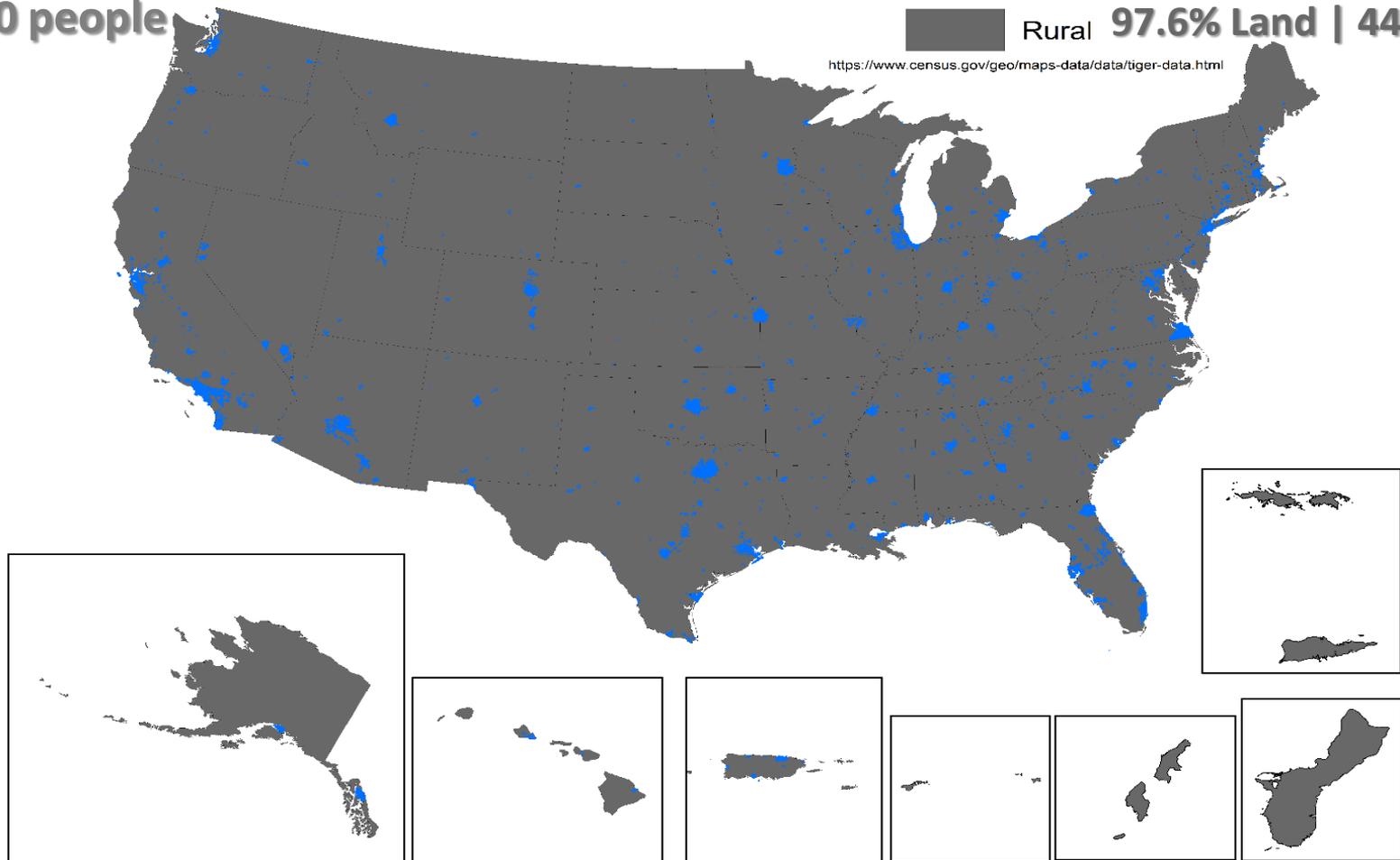


Mapping the Results

All US Census Places >20,000 & adjacent to
>50,000 people

Urban **2.4% Land** | **55.8% Pops**
Rural **97.6% Land** | **44.2% Pops**

<https://www.census.gov/geo/maps-data/data/tiger-data.html>

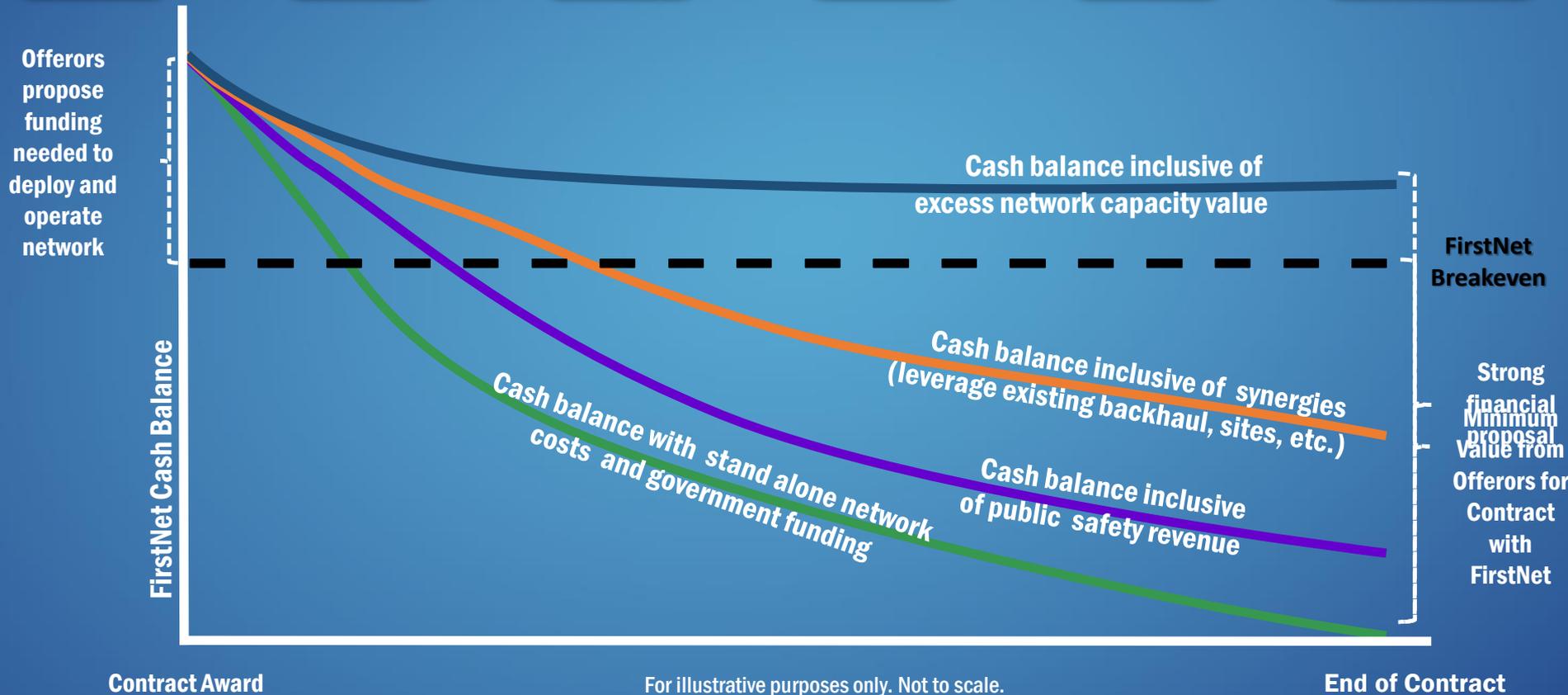


Statement of Objectives



-  Build, Deploy, Operate and Maintain the NPSBN
-  Financial Sustainability
-  Compelling and Competitively Priced Services
-  Device Ecosystem
-  Application Ecosystem
-  Accelerate Speed to Market
-  User Service Availability
-  Service Capacity
-  Cyber Security
-  Priority Services
-  Integration Of Opt-out State RANs
-  Integrate Existing State/Local/Commercial/Federal Infrastructure To Support NPSBN Services
-  Lifecycle Innovation
-  Program and Business Management
-  Customer Care and Marketing
-  Facilitate FirstNet's Compliance With the Act and Other Laws

The FirstNet Opportunity



“FirstNet must provide a service that is compelling to public safety in order to earn your business.”

Sue Swenson
Chairwoman, FirstNet

Stay Connected with FirstNet



- The FirstNet **website** (www.firstnet.gov) provides valuable information, including:
 - Program background and procurement information
 - Fact sheets, Presentations
 - Blogs
 - SPOC and PSAC information
 - FirstNet Board meeting materials.
- FirstNet's **social media** accounts are key resources for keeping stakeholders informed on the latest FirstNet news.

-  Twitter (@FirstNetGov)
-  Google+ (+FirstNetGov)
-  YouTube (FirstNetGov)
-  Flickr (FirstNetGov)
-  LinkedIn (First Responder Network Authority)

