State of California **Public Utilities Commission**
San Francisco

M E M O R A N D U M

Date: **June 19, 2015**

To: **The Commission**
(Meeting of June 25, 2015)

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Subject: **First Responder Network Authority (FirstNet) Nationwide Public Safety Broadband Network Special Notice – D15PS00295, Issued April 27, 2015**

RECOMMENDATION: The CPUC should file comments in response to the First Responder Network Authority's (FirstNet) Nationwide Public Safety Broadband Network Special Notice (Solicitation No. D15PS00295), issued on April 27, 2015 ("Notice"). The Notice includes draft sections FirstNet may include in a subsequent request for proposal (RFP) used to procure services to build the Nationwide Public Safety Broadband Network (NPSBN or "network"). FirstNet requests comments from interested parties including states, tribes, territories, public safety entities and potential vendors on its proposed acquisition strategy and approaches. FirstNet anticipates releasing the RFP in December 2015 or early 2016.

Staff recommends that the CPUC file comments urging FirstNet to ensure:

- adequate financing for the network;
- adequate network coverage, both in terms of geographic area (urban, rural and unpopulated) and harmonized network throughput;
- adequate speeds and performance testing; and
- that FirstNet require the latest commercially available technology.

Comments must be submitted by Monday July 27, 2015.

BACKGROUND: First responders and other public safety entities frequently rely on thousands of separate, incompatible, and often proprietary land-mobile radio (LMR) systems for their mission-critical voice communications. Often these LMR systems lack "interoperability," capabilities allowing first responders to communicate with their counterparts in other agencies using differing systems, a long-standing concern stemming back to emergencies such as the September 11, 2001 terrorist attacks or natural disasters such as Hurricane Katrina in 2005, where the lack of interoperable public-safety communications hampered rescue efforts and the overall effectiveness of public safety operations. To address these concerns, Congress passed the Middle Class Tax Relief and Job Creation Act of 2012 (Public Law 112–96 or "Act"),[1] which created the First Responder Network Authority (FirstNet) as an independent authority within the National Telecommunications and Information Administration (NTIA) to establish, operate and maintain an interoperable public safety broadband Internet network.[2] FirstNet holds the single public safety wireless license to ensure the building, deployment, and operation of the nationwide public safety broadband network, in consultation with Federal, State, tribal and local public safety entities. Its responsibilities[3] include the following:

- ensuring nationwide standards for use and access of the network;
- issuing open, transparent and competitive requests for proposals to build, operate, and maintain a network meeting the minimum technical requirements;
- encouraging vendors to leverage, to the maximum extent economically desirable, existing commercial wireless infrastructure to speed deployment of the network; and
- managing and overseeing the implementation and execution of contracts or agreements to build, operate, and maintain the network.

Among other tasks, First Net is required to:

- ensure the safety, security and resiliency of the network;
- promote competition in the equipment market, including devices for public safety communications, by requiring that equipment for use on the network be:
  - built to open, non-proprietary, commercially available standards;
  - capable of being used by any public safety entity and by multiple vendors across all public safety broadband networks operating in the 700 MHz band; and
  - backward-compatible with existing commercial networks to the extent that such capabilities are necessary and technically and economically reasonable;

[1] Title VI of the bill was on Public Safety Communications and Electromagnetic Spectrum Auction, and is commonly referred to as "The Spectrum Act."

[2] Codified in 47 U.S.C. §§ 1421-1443.

[3] Listed in 47 U.S.C. § 1426 (b).

- promote integration of the network with public safety answering points; and
- ensure maintenance and operation, taking into account new and evolving technologies.

To fulfill these objectives, Congress authorized $7 billion in funding[4] and reallocated the "D block" of 700 MHz of radio spectrum to build the network.[5] The Act established a Network Construction Fund to finance all activities except administrative expenses.

The Act requires FirstNet to consult with regional, state, tribal, and local authorities regarding decisions such as those concerning the costs of the policies it formulates, including expenditures for the core network, placement of towers, coverage areas, security and priority access for local users.[6] Karen Wong, of the Governor's Officer of Emergency Services (OES), is California's designated contact.

The Act allows states to join FirstNet or to build a statewide radio access network (RAN). FirstNet must notify the governor of each state or his/her designee when it completes the RFP process, including the details of the proposed plans and the amount of funding available to the state if it participates in the FirstNet program. The state will then have 90 days after FirstNet's notification to agree to participate or to notify FirstNet, the NTIA, and the FCC of its intent to deploy its own RAN, and an additional 180 days to provide its plan to the FCC.[7]

Opt-out states must comply with the same requirements as states participating in the FirstNet network, including meeting requirements on financial sustainability, timeliness, cost-effectiveness, security, coverage and providing services that are comparable to FirstNet.[8] Opt-out states will be required to pay a user fee for access to FirstNet's core network and are not be permitted to enter into commercial markets or lease access to its network except through a public-private partnership. Any revenue to the state from a partnership must be used only for costs associated with its broadband network. If the FCC approves a state's plan, it will be eligible to apply for a grant, administered by the

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[4] 47 U.S.C. § 1457 (b)(3).

[5] Reallocated under 47 U.S.C. § 1411, the term "700 MHz D block spectrum" is defined in 47 U.S.C. § 1401 (2) as the spectrum between the frequencies from 758 megahertz to 763 megahertz and between the frequencies from 788 megahertz to 793 megahertz.

[6] 47 U.S.C. § 1426 (c)(2)(A).

[7] 47 U.S.C. § 1442 (e)(1)-(3).

[8] Statement of Objectives, Section C.6 State Coverage Objectives, p. 5.

NTIA, funded from the Network Construction Fund created by the Act. The amount may be subject to matching grant requirements.[9]

If the FCC does not approve the plan, the state must participate in the nationwide network.[10]

On April 27, 2015, FirstNet released its Notice seeking comments from interested parties.[11] This Notice includes draft sections that may be included in a subsequent RFP used to procure services to build its network. The Notice contains, among other items, general project objectives, numerous technical requirements, a general project schedule and potential coverage maps. FirstNet proposes to provide for either a single entity responsible for providing all functions of the network on a nationwide level or regional entities providing the radio access network (RAN).[12] The Act provides FirstNet operating authority until February 22, 2027. FirstNet anticipates releasing the RFP in December 2015, and awarding a contract to run through 2022, with additional options to extend it through 2027 and 2032.[13]

DISCUSSION AND RECOMMENDATIONS: Staff recommends that the CPUC file comments on the following issues:

Ensuring Adequate Funding

In the Notice, FirstNet states it may require bidders to propose how much of the $6.5 billion in government funding it will make available is needed to deploy, operate, and maintain the network, including the timing of when the funding is required to achieve the initial operating capability milestones. Bidders also may be required to propose the level of fixed payments (payable to FirstNet) for excess network capacity and public safety revenues. FirstNet anticipates providing bidders the flexibility to establish reasonable pricing of end-user services, subject to the annual review process by the NTIA. It further anticipates establishing subscriber targets the winning bidder must be met.[14]

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[9] 47 U.S.C. §1442 (b)(1) requires a 20 percent non-federal match for grants made under a separate State and Local Implementation Grant Program, though that requirement may be waived. It is unclear if the match requirement applies to grants from the Network Construction Fund.

[10] 47 U.S.C § 1442(e)(3)(C)(iv).

[11] FirstNet has since revised its Notice on several occasions.

[12] In the case of the latter approach identified in (2), a region may be no smaller than a single state or territory, but may span more than one such state or territory.

[13] Special Notice, 5.1 Proposed Period of Performance, p. 9

[14] Special Notice Section 4.5, p. 7.

Staff Recommendation: Staff recommends that the CPUC express significant concern that FirstNet may not have sufficient funds to deploy, maintain, and operate the network. An April 2015 U.S. Government Accountability Office (GAO) report provided several cost estimates for constructing a nationwide public-safety broadband network. Dating from 2007 to 2011, the estimates for upfront costs range from $7 billion to $18 billion, with total costs range from $12 billion to $47 billion, depending on the scope and other assumptions.[15] A June 2011 analysis prepared by the Congressional Budget Office (CBO) also projected significant cost estimates for constructing this network, as well as other challenges the network must overcome to be financially viable. These numbers indicate that, absent sufficient funding, FirstNet may be in the position of having to build a smaller network than planned, or expanding the user base beyond current planned entities or making other cost-saving choices.

Ensuring Adequate Statewide Coverage, Including Rural Areas

The RFP's winning bidder will need to build the network according to the five year schedule.[16] Start dates for subsequent phases are dependent on completion of each previous phase.[17]

As stated previously, Congress included a requirement that, in general, to "the extent economically desirable," the vendor must leverage existing infrastructure.[18] The vendor also must deliver an affordable network to public safety entities while continuously upgrading the system throughout the lifecycle of the contract as LTE standards and beyond (5G, 6G) evolve, as public safety needs expand, and new capabilities and technologies become commercially acceptable and available.[19] The winning bidder must in five years meet a "substantial rural milestone" whereby "[a]t least 20 percent (20%) of total covered area for each… deployment phase… comprise[s] areas defined as rural (coverage measured in square miles)." Additionally, within 48 months of the award, all major highways" must be covered.[20] Figure 1 shows FirstNet's Baseline Coverage Map for California.

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[15] Government Accountability Office, *FirstNet Should Strengthen Internal Controls and Evaluate Lessons Learned, Report to the Chairman*, GAO 15-407, p. 31, April 2015.

[16] Statement of Objectives (SOO) Appendix C-8, IOC / FOC Target Timeline, p. 1-2.

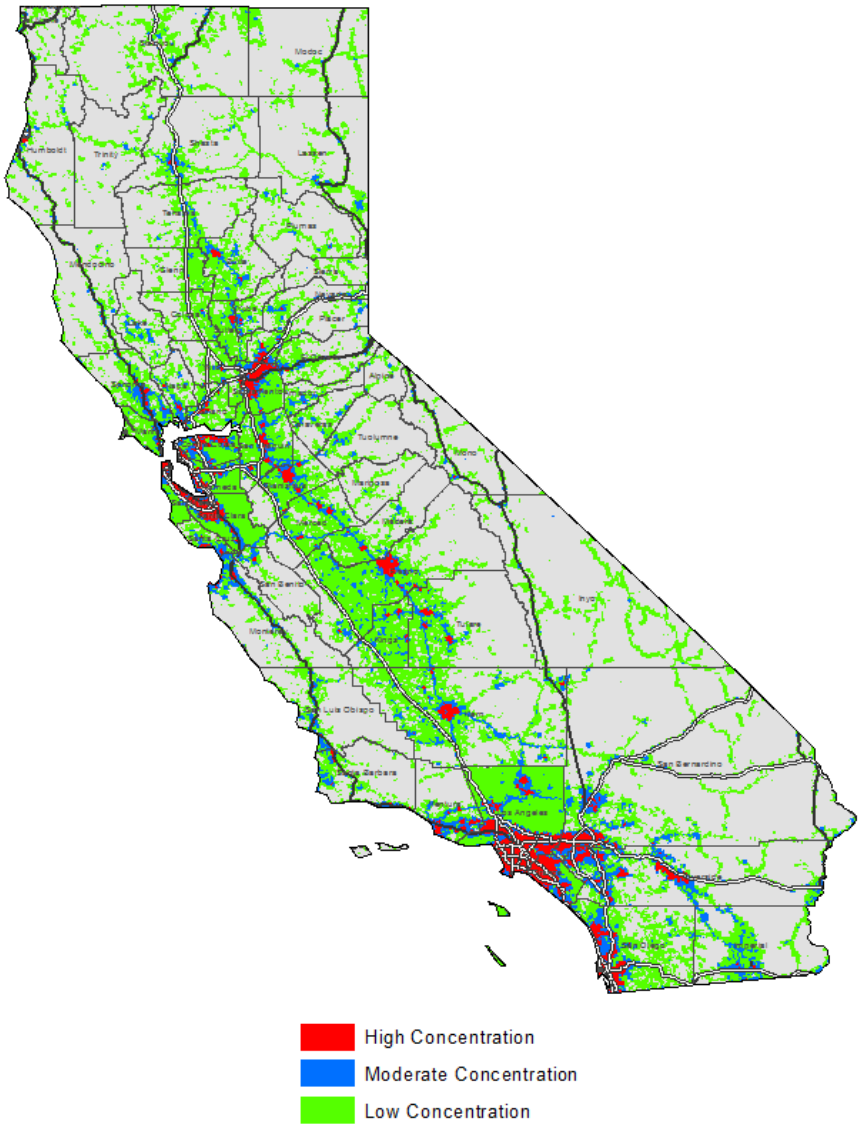
[17] SOO Appendix C-8, IOC / FOC Target Timeline, Sections 4.2, 4.3, and 4.5

[18] 47 U.S.C. § 1426 (b)(1). The term "economically desirable" is not defined in this section.

[19] Statement of Objectives, C.3 Program Description, p. 2.

[20] SOO Appendix C-8, IOC / FOC Target Timeline, Sec 3 Definitions, p. 4. Note that a rural area is defined as "a city, town or incorporated area that has a population of less than 20,000 inhabitants." The timeline outlined in Appendix C-8 p. 2 provides for 15% of the substantial rural milestone being met within 12 months of the RFP award, 40% within 24 months, 60% within 36 months, 80% within 48 months and 100% at 60 months.

Figure 1: FirstNet Baseline Coverage Map for California[21]



Color	Title	Description
RED	High concentration	This would indicate an amount of users, areas of interest, U.S. population, developed areas and roadways
BLUE	Moderate concentration	This would indicate an amount of users, areas of interest, U.S. population, developed areas and roadways
GREEN	Low concentration	This would indicate an amount of users, areas of interest, U.S. population, developed areas and roadways

[21] FirstNet coverage objective baseline map was created as a starting point to identify potential public safety priority for permanent terrestrial coverage (red/blue/green areas). The non-color regions represent areas identified as needing on-demand temporary or extended range coverage and capacity solutions. (SOO Appendix C-1, Baseline Coverage Objective Maps, p. 1).

Staff Recommendation: Staff recommends that the Commission encourage FirstNet to ensure adequate coverage in rural and other non-urban areas. While 95 percent of Californians live on 5 percent of the State's land mass, residents and visitors use much of the state for business, recreational and other personal purposes. To meet public safety needs, FirstNet must ensure the network's coverage area reflects this reality. Moreover, CD analysis indicates that rural and tribal areas have half the throughput of urban areas, and the TCP (transmission control protocol) failure rate is twice as high in rural and tribal areas. FirstNet should require its contractor to harmonize its throughput provision such that rural areas receive the same performance as urban.

Additionally, FirstNet's proposed mapping methodology and grid characterization raise other problematic issues. Areas with low population should not be assumed to have low likelihood for public safety response without a more careful study based on probability and risk. Further, FirstNET still will need to be deployed in low-concentration areas based on other public safety factors such as fire risk, earthquake faults, or heavily used national and state parks. The CPUC should reiterate the need for sufficient coverage, in rural, remote and urban areas, both in terms of geographic area and network throughout parameters.

Finally, the Notice does not discuss emergency backup solutions in areas lacking network coverage. It is unclear if FirstNet envisions temporary solutions, using satellite communications of mobile cellular towers (e.g. COWs) in these instances. The CPUC should recommend that FirstNet require backup solutions, where necessary, in its RFP.

Ensuring Adequate Speeds (Baseline Coverage Maps, Appendix C-1)

FirstNet's Notice proposes to define baseline coverage as an area having a minimum of 768kbps downstream and 256kbps upstream at the cell edge with 50 percent loading. Grid blocks that with have more than 50% coverage meeting or exceeding these data speeds will be accepted.

Staff Recommendation: Staff recommends that the CPUC express concern that FirstNet's minimum proposed speeds are inadequate. Speeds of 768 kbps downstream and 256 kbps upstream are insufficient to support multiple use activities as well as high bandwidth applications, such as streaming video, including the minimum network application requirements contained in the Notice.[22] CPUC mobile testing indicates users form certain providers already receive downstream speeds as high as 38mbps.

Additionally, the CPUC should recommend that FirstNet use speed tests in its network performance evaluations. CPUC statewide mobile field testing research indicates that

[22] SOO Appendix C-3, *Recommended Minimum Technical Requirements to Ensure Nationwide Interoperability for the Nationwide Public Safety Broadband Network*, Table 4: QoS Class Identifiers, p. 77.

speed is a more reliable predictor of throughput than signal level, which FirstNet proposes. Additionally, the specifications for data performance should also include latency, jitter, and packet loss in order to support streaming services such as VoIP and real-time video. FirstNet should include all of these measurements in its network performance tests.

Further, the Notice contains no indication of how speeds would be measured and validated. The CPUC's field testing experience shows that high variability in mobile data speeds leads to inconsistent user experience. Further, mobile tests indicate that a mobile provider's streaming capability and coverage can differ significantly from their downstream throughput coverage. In order to best predict 95 percent reliability, FirstNet should calculate speeds using a meaningful standard.

Technical Requirements (Minimum Technical Requirements, Appendix C-3)

FirstNet's technical requirements rely on a May 2012 report from the Technical Advisory Board for First Responder Interoperability entitled *Recommended Minimum Technical Requirements to Ensure Nationwide Interoperability for the Nationwide Public Safety Broadband Network*, as required by statute. The report makes recommendations in the following areas:

- 3GPP LTE Standards, Interfaces and Guidelines
- User Equipment and Device Management
- Testing
- Evolution
- Handover and Mobility
- Grade of Service
- Prioritization and Quality of Service
- Security

Requirements range from general expectations to very technical network engineering requirements and device interface standards.

Staff Recommendation: Staff recommends that the CPUC express concern that the proposed standards may be outdated. For example, the report states that "[a]s of this writing, commercial service providers in the U.S. have not commercially deployed an LTE telephony solution, and thus it is not prudent to require FirstNet to advance ahead of commercial service provider deployments with this technology."[23] Providers have begun deploying voice over LTE (VoLTE). Thus it would be prudent to require the selected

[23] SOO Appendix C-3, *Recommended Minimum Technical Requirements to Ensure Nationwide Interoperability for the Nationwide Public Safety Broadband Ne*twork, Section 4.1.10.1.6 PSTN Voice, p. 43.

provider to offer the latest commercially available technology. This will enable secure access to databases used by public safety entities, among other benefits. Staff recommends the CPUC encourage FirstNet to issue more current and specific technical standards regarding network performance, cell site availability, interoperability with external databases, battery backup requirements and device performance. Additionally, FirstNet should revise its interoperability requirements to specify how it expects land mobile radio (LMR) to operate on LTE devices.

Contracting Practices

FirstNet's draft RFP proposed contracting practices also could use significant improvement. For example, the draft RFP includes the following statement: "Prior to operational deployment on the NPSBN, infrastructure equipment *SHOULD* have passed FirstNet-required Performance Testing of individual interfaces, nodes and overall system as per the specific performance requirements of the NPSBN." But, a timeframe for the acceptance testing and test specifications is missing.

Second, the previously referred to timeline targets present risk delays, as each milestone's start date is tied to the completion of the previous milestone. This approach could lead to delays, because when a completion date slips, the subsequent start date for the subsequent milestone also would be delayed. Multiple delays lead to cost overruns.

Third, the timeline suggests that the vendor is responsible for developing and producing the FirstNet devices. If so, it would be important to tie acceptance testing and payments to specific, end-to-end field performance criteria that depend on proper functioning of the device in the deployed network.

Fourth, the timeline relies on the term "substantial completion" to indicate finishing a specific task. Although widely used in infrastructure construction, this term is open to interpretation, introducing an opportunity for the vendor to under-deliver.

Staff Recommendation: Staff recommends that the CPUC suggest the following improvements in FirstNet's proposed contracting practices.

- The RFP should contain the timing of the acceptance testing and testing specifications. The timing of this testing is critical to mitigate scheduling risk. Performance testing should be a pre-condition for acceptance and payment. Performance test criteria should be made part of the RFP, because if they are made after vendor selection, criteria will be negotiated downward by the vendor. Moreover, if the vendor is also providing the devices, testing should specify the tests be done using the vendor-supplied devices.

- The RFP should tie schedule milestones to the original award date to ensure a delay in achieving one milestone does not affect later milestones. The RFP should also include device development milestones, if the vendor is responsible for developing and producing the FirstNet devices.
- The RFP should clearly define "substantial completion."

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