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Response to: **Notice of Inquiry on FirstNet Conceptual Network Architecture**

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11 October 2012

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Subject: NTIA issues this Notice of Inquiry on behalf of the First Responder Network Authority (FirstNet) to seek public comment on the conceptual network architecture presentation made at the FirstNet Board of Directors' meeting held on September 25, 2012, as well as to invite input on other network design and business plan considerations.

Thank you for the chance to provide information to such a great national program. Attached you will find my response to the questions relating to the rollout of the Nations Broadband Network for First Responders. This document is by no means complete, but rather touches on a few important topics.

Sincerely yours,

Dr. Michael Myers

Abstract

This document is in response to the NTIA's request for information on its conceptual network architecture discussion. This document is by no means complete, but does address the lack of a sound business model and overall strategy. This response document does start to fill that void by outlining a functional model and actionable strategy that is driven by a solid business archetype. This proposed model avoids the use of taxpayer subsidy yet provides the needed funding and operational framework for the entire national build out.

> *"The competitive framework for communications services should foster innovation and offer consumers reliable, meaningful selections in affordable services. The FCC pursues removing regulatory, economic and operational barriers throughout the telecommunications sector."* (FCC WEBSITE, 2012. RETRIEVED: WWW.FCC.GOV/SPECTRUM)

Summary

In reviewing Mr. Farrill's slide presentation material, which was presented to the inaugural FirstNet Board meeting, I find that the presentation, or any information coming out of the FCC/NTIA/FirstNet so far, to be drastically deficient in addressing the critical issue of funding. There have been ample amounts of technical design, deployment configurations and interoperability issues that have been addressed at many levels, but all fail to tackle the basics of a sound business model that describes the solution in its entirety. Most importantly they fail to adopt any aspects of true Public Private Partnerships as a means of fostering innovation or stabilizing any sound approach to funding and building the nations largest telecommunication program. Without a sufficient business model, led by a strong strategy, we risk total stagnation of the program no matter what technical design we wish to consider.

As implied in the Federal Legislation, FirstNet and ultimately the national deployment, will require strong Public Private Partnership (P3) models addressed at both the Federal and State levels. By not first pursuing a P3 model at the State level the Public Safety Broadband Network will be hugely deficient in its ability to obtain the required funding to make the deployment a success.

Tackled in this document is a valid business model that has taken precursory steps to administering a proven successful model. This business model utilizes the arrangement of Public Private Partnerships at both the FirstNet and at the State levels. This model has proven that not only can we completely fund the entire National Public Safety Broadband Network deployment, but also adequately provide the required "self funding" capability for the foreseeable future. The beauty of this model is that it does not require any taxpayer money to accomplish most of what needs to be done, yet at the same time it manages to increase the opportunity for putting Americans back to work as well as perform structured cost savings for all involved.

An abbreviated PowerPoint Presentation of this model is downloadable at:
https://dl.dropbox.com/u/7260104/Response%20to%20NTIA%20RFI%20PowerPoint%20Presentation.pdf

Financial Modeling

In retrospect to Mr. Farrill's presentation it will be necessary to create the financial model first, and its governing support system, before any technically deployable design can be administered. The financial considerations will impact the overall design and its deployment roadmap. Most importantly, without a business case, FirstNet will risk the ability to tap into fixed recurring revenue streams from internal State entities that require private broadband service; as well as the magnetism of private investment to fund the entire Build, Operate and Own model within a State PSBN solution. The business case, or financial model, will provide the thought leadership that will generate the goals and objectives for the national plan. We must not be dismayed from the fact that we are creating the largest telecommunication program in our history, thus its imperative that we outline a sound strategy and business solution that generates the needed funding and revenue.

Before any conceptual, or detailed, design process can be administered there must be an alignment of business objectives between FirstNet, the States, and State/Federal entities. Without taking into consideration the cost impacts, and the nature of fulfilling the essential elements of a Public Private Partnership (P3), FirstNet, and a State, will convolute the alignment of business objectives between FirstNet and the State's internal agencies -- who will predominately have the responsibility for "Public Safety Services". This limitation will have lasting impacts on the establishment of the much-needed capital for an executable program of deployment and long-term "self-funding" operational framework.

Without such basic financial structures we will ultimately risk creating chaos and confusing the "self-funding" capability as required in the legislation, which may result in returning to square one of our implementation schedule and design. Plus, any time delays introduced snowballs the technological impacts – to name the least. Therefore, it is imperative that FirstNet, in coordination with the States, establish its guidelines for a sound Public Private Partnership model – business case – that can be administered, in duplicity, at the State level. It is recommended that we coordinate the business objectives of all the State entities by focusing on a common variable between them -- that being the need for broadband service.

Revenue Generation and the P3

It is estimated that the entire Public Safety Broadband Network will cost between 50-100 Billion dollars, with additional Operations and Maintenance costing 10% of the capital build program annually. The only possible way of generating enough recurring revenue to sustain the entire design, build and operational aspects of the PSBN is through Public Private Partnerships. Although carrier advice is appreciated, such a model does not require a carrier solution, or carrier support, to make this happen. It is premature to consider the detailed design necessities of carrier roaming, or commercial interoperability, with the Public Safety Broadband Network (PSBN) when the financial modeling for recurring revenue hasn't even been established. There is a time and place within the design that carrier and commercial roaming needs to be addressed -- but now is not that time.

In order to correctly initiate the cyclical P3 process FirstNet, and the States, needs to consider the process of 4 primary agents. As depicted below (Figure 1 - P3 Cyclical Process) the four primary agents are:

1. FirstNet and State that have Public Safety Broadband needs
2. Internal State and Federal Agencies and Entities that require broadband access and who can generate a fixed recurring revenue stream
3. Private Equity which is attracted to the fixed recurring revenue and is willing to propose a Build, Operate and Own State Broadband Network
4. Broadband technology delivers the FirstNet and State Public Safety requirements

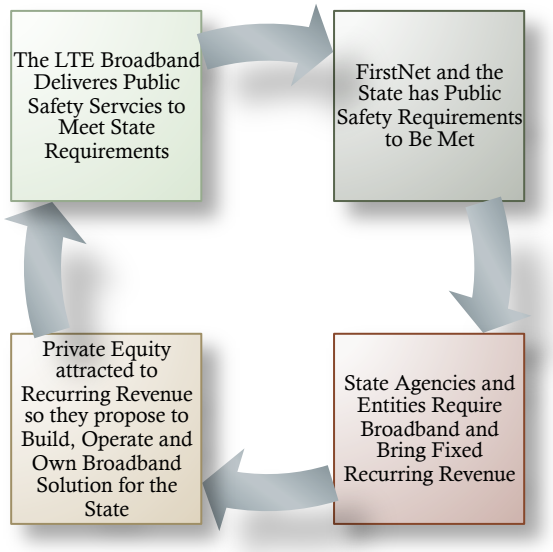

Figure 1 - P3 Cyclical Process

To understand the overall goal of the P3 format and how all the inner workings are connected you can download the following chart in a larger more readable format.[1]

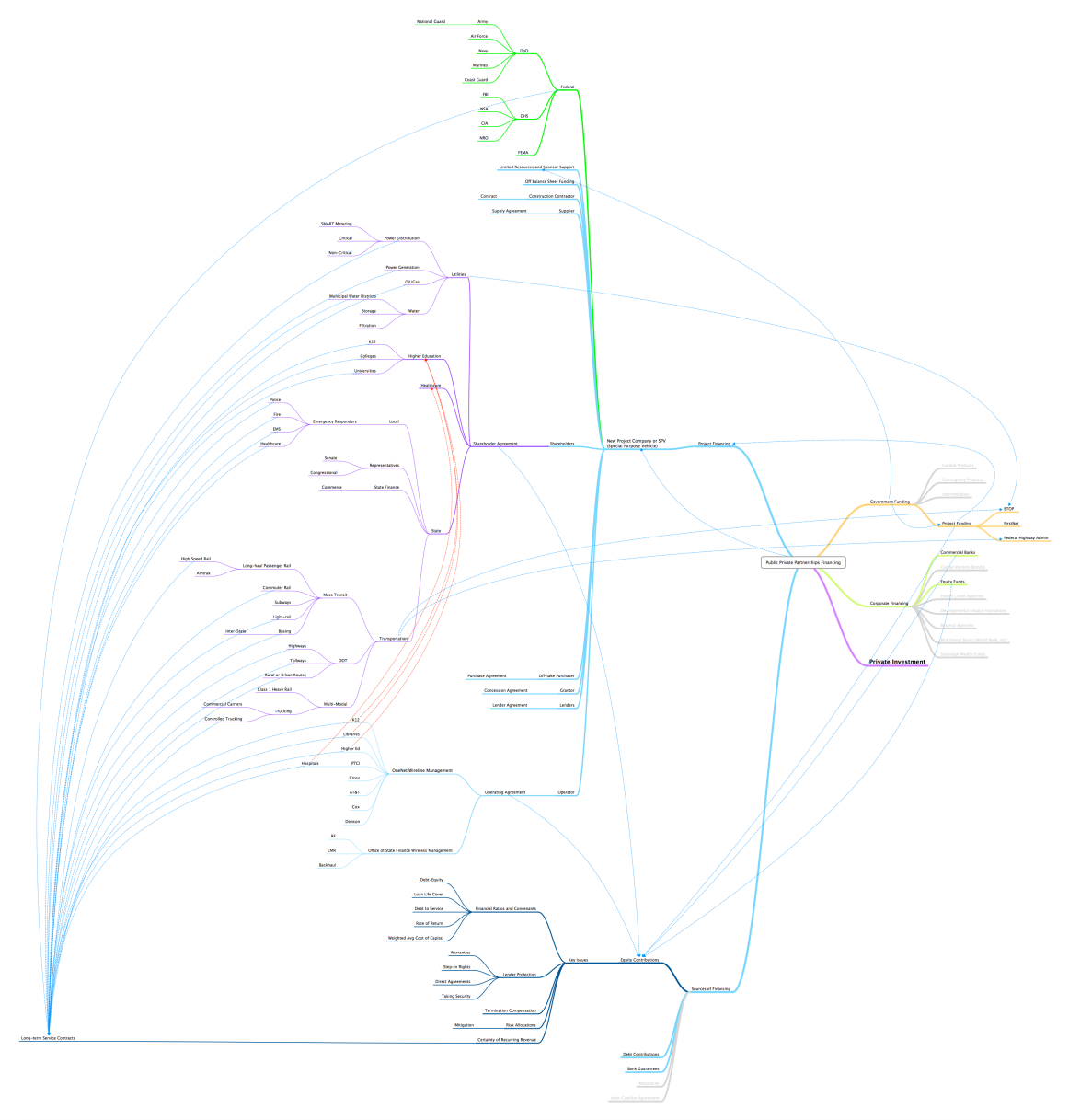

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Figure 2 - Public Private Partnership Flow Diagram (See footnote to download image 1)

[1]The following chart illustrates a flow diagram of the Public Private Partnership model that FirstNet could use. This model is by no means complete but illustrates a great deal. Created: Oct 2, 2012. Dr. Michael Myers https://dl.dropbox.com/u/7260104/Public%20Private%20Partnerships%20Financing.png

FirstNet – Financial Modeling team

In order to affectively build a base of financial support it's imperative that FirstNet should consider the establishment of a financial modeling team to address the Public Private Partnership arrangement and how best to implement it before we commit to a physical build. This team would generate a replicable business case template that the States could execute on as well as provide the much-needed guidance of how to structure their own Public Private Partnership models.

As per a private equity player it was suggested that one State be utilized as the test case scenario. Such a model has already been presented to a mid-western state and a business case has already been generated by one if its roughly 67 internal State organizations -- an Electric Cooperative. This model successfully demonstrates the viability of a Public Private Partnership; as well as the tremendous cost savings and revenue generation for the State, the Electric Cooperative, and the private equity players. Such a model should be taken into consideration by this team for the betterment of the holistic national model. By not doing so we risk the benefits of recurring revenue from the States and paying private investment scenarios that may avoid taxpayer financial responsibility, which in turn would ultimately dampen our support from the American people, the market and the government.

It should be noted: this actual State model does not use any taxpayer money; and it doesn't involve any carriers at this time. It does provide vast amounts of State level employment, industry investments, risk diversification and long-term gains for all parties involved.

It is a given that the majority of the physical deployment will be performed at the State level. In doing so the State should be able to balance the needs of its internal agencies, and all its entities, by aligning their complimentary business goals with that of the State Public Private Partnership (State P3) which inherently will be utilized to pay for the PSBN build and its long-term operations. It is not enough to have technical interoperability alone. In order to be successful we must align the business objectives of all parties involved; that means finding a common element that all can utilize…that element is 4G broadband itself.

Physical Execution of a nationwide broadband network, that is targeting 99% geographic landmass of the United States and its outlying territories, will ride on the successful implementation of a sound Public Private Partnership strategy that starts at the top; remains flexible enough to attract private investment; and maintains all the core aspects of its solution. By leading with a design and a thought process that mandates the use of a carrier model will not suffice and ultimately will lead to mass confusion and a failure of the nationwide deployment resulting in a reconsideration of executable frameworks. In time the carrier connection will be made, as will its design characteristics of interoperability.

The essential elements of a successful P3 for the Pubic Safety Broadband Network (PSBN) that need to be considered are:

- All entities will be required to have "Public Safety Service" responsibilities
- Clients that require broadband services to sustain business operations
- Clients who typically would have to build it themselves
- Clients willing to pay an a fixed annual operation cost
- Investors willing to pay for the capital program and build-out
- Investors willing to create a standalone broadband company for the State
- Investors willing to take on risk of a Build, Own and Operate model
- A State willing to sub-lease its spectrum allocations to a private holding P3
- A State willing to centralize internal entities as customers
- State and Federal Government support to insure success during tough times

In order to execute such a P3 framework it will be necessary for each State, in coordination with FirstNet, to issue a pre-formatted RFP that will be advertised to the private equity market soliciting a "Build, Operate and Own" model for the given State PSBN deployment (this same format can be used for the FirstNet governance support and network/operational necessities as well). This RFP will be generated and managed at the State level under the observation of the FirstNet. Reason being is that certain states have State Constitutional guidelines that must be followed, and that are protected under the Tenth Amendment of the Constitution, so by allowing the States to run a template procedure from FirstNet should adequately meet any State and Federal laws.

By targeting the private equity and investment community, much like they do in other industries, these private equity players will setup a team that will compete for the State P3 opportunities. Overall these private investment teams will propose a "build, own and operate" solution for the State and will relinquish majority ownership to State and Federal control (49% ownership to private equity and 51% ownership to the State and FirstNet). In part these P3 private equity teams will coordinate typical teaming arrangements that are accustomed to the telecommunications industry. Their first selection will be to solicit General Contractors (GC) as part of their teams.

These GCs will lead the effort of managing the overall design, build, operate and maintenance (long-term) model delivered in their individual bids. The GC will also bring in various equipment vendor solutions as part of their overall teams. As required these bids will include the approved LTE, backhaul, satellite and/or core elements of the proposal that must meet the FirstNet interoperability design standards laid out. The State will then select the most attractive bid for its award. Outside of the addition of the private investment community being targeted for the State's P3 RFPs all the rest of the process follows typical telecommunication project management methodologies, arrangements and procurement procedures…as if it were just another State telecommunications program.

Depending on the private equity team makeup, its proposed (physical) design solution could vary, thus any premature design mandates will complicate this matter. Every State will be slightly different in how it deploys and constructs its portion of the network. Creativity associated with the State's demands for its physical build characteristics will be taken into consideration and aligned

with the appropriate request for proposal requirements. At the same time these proposal requirements will maintain the alignment with the overall conceptual design and its interoperability roadmap laid out by FirstNet.

In the end the awarded private equity team will fund their entire solution, as well as long-term management services, thus not requiring taxpayer money. In return the private equity players get to share in the 49% of the revenue from the long-standing contracts established with the internal, and external, State agencies and entities. These SLA contracts will also establish a fixed long-term recurring revenue forecast that the State, and FirstNet, who could then reinvest (their own 51%), if they choose, back into the network as research and development; further advancing the Public Safety Broadband Network into other areas it sees fit, e.g. pushing commercial rural broadband coverage to optimize network usage during under-utilization periods, applications development, or non-emergency situations.

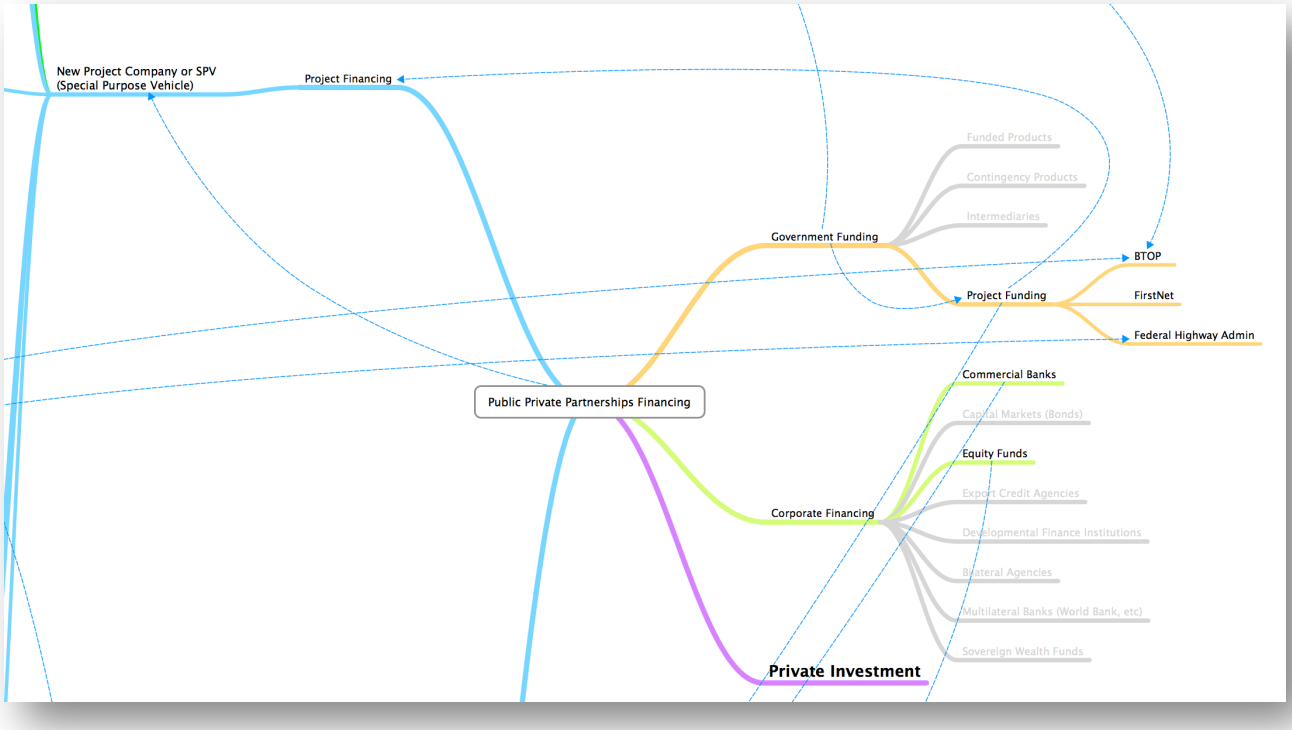

Figure 3 - P3 Private Investment Sources[2]

[2] The following chart illustrates a flow diagram of the Public Private Partnership model that FirstNet could use. This model is by no means complete but illustrates a great deal. Retrieved: Oct 2, 2012. https://dl.dropbox.com/u/7260104/Public%20Private%20Partnerships%20Financing.png

Following standard RFP practices the request will solicit a "Build, Own and Operate" model. Further highlighting the RFP process it will be essential that the RFP follow a typical template process that will utilize customary procurement layouts with a fixed high-level design that focuses at the State level. This RFP will incorporate the desired high-level design characteristics, interoperability standards, management, and governance for procurement as arranged by FirstNet.

The RFP design solution will most likely be laid out in phases to which a majority of the build can be consolidated under the available resources and assets of the State (aligned with the existing grant process of $135 Million allocated to each State for planning and audit phase). The design requirements within the RFP should remain generic in nature and illustrate the requirement of approved LTE vendor radio technology; Microwave and fiber backhaul when available; and the use of fiber transport connectivity between consolidated and centralized State network and data center operations. It will also dictate the northbound interfacing with the overall core network of the nationwide element. At this stage it should not prescribe companies and/or commercial carriers that must be utilized. It is premature to dictate what available resources will be available in all fifty States, plus the territories. In my professional opinion the State will know better as to which, if needed at all, commercial carriers should have a play in the network.

Much of the States assets will provide adequate private networking and resourcing capabilities. Such a maneuver will also allow the States to consolidate and centralize required assets producing further cost savings at the State level, which in turn will provide cost savings at the Federal level as well. It will be imperative that we allow the State to take the lead in centralizing its resources; constructing its database of available infrastructure; negotiating its rights with its internal agencies; and combining state assets (which may include commercial carrier agreement). It will also be crucial that the State be allowed to manage its own Public Private Partnership and its statewide bidding process for private equity and contractors.

At the beginning it is essential to limit to the physical design characteristics to a high-level approach, thus allowing the potential private equity teams to submit their own creative design solution that meets, integrates, and consolidates, all the State agency and entity needs into one overall State design, e.g. hardening and footprint requirements, at the same time aligning their individual business goals as a long-standing client base. FirstNet should only provide the high-level aspects of a design, such as an approved LTE vendor solution that meets the interoperability guidelines, and the fact that a typical broadband solution should be utilized, such as backhaul, RAN, fiber transport and satellite if required.

In coordination with the State audit and planning phase each State entity will justify its broadband service demands, which in turn illustrates the State's design requirements. As an example: in one geographic location a Power Utility may require 24 hour back generation for its tower locations, where as a Local Police Force located in the same area may only require 16 hours; therefore the overall design for that area will be 24-hour back generation, thus meeting all requirements. Such a justification scenario for each entity's requirements illustrates the connection with the overall statewide design demands and the private investment proposals. Such demands will be illustrated in the State's P3 RFP and will be covered in the private investment teams proposal back to the State.

It is assumed that all the design characteristics will follow the national plan of design and interoperability as laid out by FirstNet. Therefore, we can assume that all State networks will have standard elements of LTE broadband designs that are typical in the commercial industry. It is recommended that no proprietary technology be utilized. To comply, every proposal submitted by the private investment teams must demonstrate the considerations of the following criteria:

1. Meets public safety's requirements for priority, quality of service, and preemption features;
2. Uses, to the extent possible, existing radio access and core network infrastructures; may include installed State networks with commercial mobile operators;
3. Reaches operational capability as quickly as possible; and

4. Enables voice services (cellular telephony and push-to-talk (PTT)) both within the FirstNet network as well as to/from other commercial networks, including the public switched telephone network (PSTN).

Recurring Revenue

The concept of Public Private Partnerships is not new to the industry and is used quite often in the transit, rail and large construction markets. But the one element that the PSBN and the State P3 has over the others is the capability to generate fixed, long-term, revenue -- revenue that can be used to help build, operate and maintain the solution for the foreseeable future. These are what is the attractive element to any private investor.

There are a host of business models to consider, such as subscriber-based models, or pay-per-use models, but it's a fact that we can generate the most recurring revenue direct from the internal State agencies and entities whom require access to the broadband network with long-standing service level agreements. These entities all have "Public Safety Service" responsibilities and are inherently part of the Emergency Response scenario. By implementing long-standing service level agreements with these entities the State P3 entity can provide broadband service to meet their individual needs. Following the establishment of the PSBN, and to a point that things have matured, we can further investigate revenue generation through service-based application and cloud-based models as well.

> *As a note: We have already performed one such business case, and business goal alignment, for a mid-western state and one its 31 State Electric Cooperatives, in addition to its 36 State Agencies, who have assets and infrastructure they can lease back to the State PSBN effort. At the same time these entities are willing to make a recurring annual payment to the State P3 for broadband service. This eliminates the need for each entity to create a capital program to build its own, similar, solution. As an example our case analysis of a small 3 county cooperative with 23,000 SMART Meters, and 12 towers, 15 backhaul locations and 30 wireless/wireline routes would see an $8.8 Million cost savings + additional revenue and an annual State P3 payment of $3 Million for LTE service (figure includes off-setting of leased back assets to the State PSBN). It should be noted that this is only one of 31 State cooperatives and does not include Investor Owned Utilities, nor Transportation, or any other State entities. It should be obvious that combined client solutions including all the State entities will generate 100's of Million of dollars in fixed annual long-term recurring revenue for the State P3 model, thus attracting private investment.*

Each internal State (and Federal) agency and entity that lies within the boarders of the respective State all have "Public Safety Services" to be rendered during an emergency, e.g. electric Utilities, Forestry, Agriculture, Transportation, Police, Fire, DoD and EMS. Each of these State agencies and entities are considered viable clients for the State PSBN and State P3 entity.

Utilizing the $135 Million grant the State can conduct and audit of available State agencies and entities. Each of these agencies and entities would conduct an inventory of assets, and available infrastructure that the State PSBN could use. The State could then work with each entity to perform a cost benefit analysis against building a similar solution itself, leasing it from commercial carriers; or ultimately leasing it through the State P3 element. Given the success of the business case created for the entity within the mid-western state; it is my professional opinion that given the cost savings, resource utilization, and private hardening requirements, it has be shown that all the State agencies and entities typically decide to buy services from the State P3.

It is through these business cases that the State can establish its recurring revenue forecast. Each entity within the State that uses the PSBN for its broadband requirement would then sign a long-term SLA contract with the awarded State P3 private equity team. The terms and conditions of these SLA arrangements can be molded to the given entities industry, e.g. a State Electric Cooperative could sign up for 20-30 year terms for broadband access from the State P3, which is typical for this industry. The SLA that is established would generate the design characteristics needed for that geographic area of the State, e.g. if the Utility requires 24 hour backup generation then it would be dictated in its SLA and thus the State PSBN would have its design characteristics acquired.

It's important to depict the FirstNet support to the state deployments with some type of federal government insurance as to attract private equity to its fixed long-term plan of operations. This acts as a type of "Deposit Insurance" function much like the banking industry has with FDIC (Federal Deposit Insurance Corporation). It's an important element of successful P3 arrangements. When investors see that the government is backing the deal then they are more prone to invest. This will be necessary anyway because FirstNet will act in authority over the governance model, and thus considered the overall authority, or Headquarter element, of the nationwide build and ultimately its operational characteristics between states, regions and geographic diversification.

With the conceptual high-level design[3] aspects laid out by FirstNet we should then concentrate on the formulation of a template for a State P3 RFP driven with the incentive to motivate private investment to the State builds. In this case there will be multiple State builds that will be needed, thus a great amount of positive market opportunities for competitive bids. Its important to remember we can't just build a network without setting up how we will pay for it first. Fortunately with the use of broadband technology we open many doors at the State level to generate a recurring revenue theme for the State P3 RFPs, which in turn will attract the needed private investment or private equity firms. Thus, as to lock-in the private investment, it will be impetrative that the Federal Government insures the longevity of the State and nationwide LTE platform.

[3] The following chart illustrates a flow diagram of the Public Private Partnership model that FirstNet could use. This model is by no means complete but illustrates a great deal. Retrieved: Oct 2, 2012. https://dl.dropbox.com/u/7260104/Public%20Private%20Partnerships%20Financing.png

Response for Conceptual Framework for Developing Applications

"NTIA also seeks input from all stakeholders on the FirstNet Board's conceptual discussion of a potential framework for developing applications for public safety use." I will only address the topic as it pertains to the business model and its implementation under a Public Private Partnership.

Another aspect of the FirstNet deployment is the lack of operational concepts associated with long-term operations. Such operations would include the monetization and use of "app" development stores specific to the "Public Safety Services", but should not be limited to that specifically. There is the potential of app development for specific vertical industry topics such as: Utilities, Transportation, Agriculture and other non-core First Responder functions that will also be declared as sensitive in nature and thus should be created in a controlled environment. There is no reason that the P3 solution for the State and FirstNet should not be allowed to benefit from such development by creating an "app store" solution that addresses all client needs.

It should be envisioned that a similar commercial solution could be utilized in the creation of; the administration of; and the eventual sale of certain applications that are essential for the Public Safety Broadband Network and the related entities that are serviced.

Another topic of concern should be the overall datacenter and network operational frameworks. Outside of the technical discussion surrounding deployment; there needs to be discussions opened surrounding the aspects of datacenter and network operations and their inter-relationships dependencies with such entities as the more than 70+ Cyber Command operation centers around the US. It will be imperative that an architecture of relationships be administered to address data flow controls, storage with data manipulation procedures and analysis. Such topics are not addressed in this document and actually lay outside of the P3 concept in that these are inherent responsibilities of the entities themselves and really do not directly impact the rollout of the broadband services itself. Such considerations would come to light in the SLA agreements from the public safety support agencies that require the broadband solution to provide the needed bandwidth to make it a success.

Conclusion

The initial primary goal for FirstNet should be to establish a team that can administer a sound business case delivered through a solid foundation of Public Private Partnerships. One of the first things surrounding that business case must be to generate a sound "self-funding" solution that will attract private investment. The second thing FirstNet must accomplish will be to create a State P3 RFP format that can be transmitted to all States (and territories) as an executable framework.

The only way to attract that kind of investment, at the levels that will be in the multi-Billion dollar range, will require long-term, fixed, recurring revenue projections back by the Federal and State Governments. Although the presentation was a great discussion starter, the real picture of how the technical solution will transpire, and present itself, will be through the sound foundation of a business model that controls fiscal responsibility and delivers sound economic impacts. We need a model that can deliver Public Safety solutions across the board for all "Public Safety Service" responsible organizations at the same time paying for its self for the foreseeable future.

As it stands the design considerations to date do not take this into consideration and the contemplations of intermingling this scenario with carrier based business models will not meet the funding requirements, nor will the overall business model align with the long-term goals of Public Safety. Carrier based support does not mean financial support -- especially not in the scale of 50-100 Billion dollars.

"This is not rocket science", but it is a complex arrangement of relationships that overwhelmingly bleed of commonalities that can benefit everyone involved in the Public's Safety.