

In Response To:
U.S. DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
On behalf of
First Responder Network Authority
Notice of Inquiry
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Title:
“Notice of Inquiry on FirstNet Conceptual Network Architecture”

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EXECUTIVE SUMMARY

Textron Systems is pleased to have the opportunity to respond to this Notice of Inquiry (NOI) from the National Telecommunications and Information Administration (NTIA). We have invested significant time and effort to develop a deep understanding of the scope, intent, and promise of the Public Safety Broadband Network (PSBN). Textron Systems sees public and stakeholder input as a critical element for the success of this undertaking and welcomes the chance to share our insights.

RECOMMENDATIONS TO FIRSTNET AND NTIA

Stabilize Requirements and Expectations: A central tenant of our NOI response is that in order for the FirstNet board to be effective it must first connect with its customers. It is critical from the beginning of the program to understand the requirements from the fire, police, emergency medical services (EMS) and other first responder communities who will use the PSBN. As shown in Figure 1, in a large scale undertaking such as the development of the PSBN, the majority of time and attention must be spent in properly defining criteria, requirements, and planning in the first several months to ensure the goal is attained. We strongly believe that FirstNet should adopt a “slow down to speed up” approach to lock in the right requirements and process so the user community will get a system that meets its needs.

The Public Safety Advisory Council (PSAC) represents the entire user community and has a strong commitment and deep understanding of the operational requirements of America’s first responders. It is imperative for FirstNet to provide PSAC with the ability to translate these operational requirements into technical and performance expectations. FirstNet must also provide PSAC with the tools to reach out broadly to all public safety stakeholders, including federal, tribal, state, territorial and local customers.

Early Mistakes Are Costly Down the Line

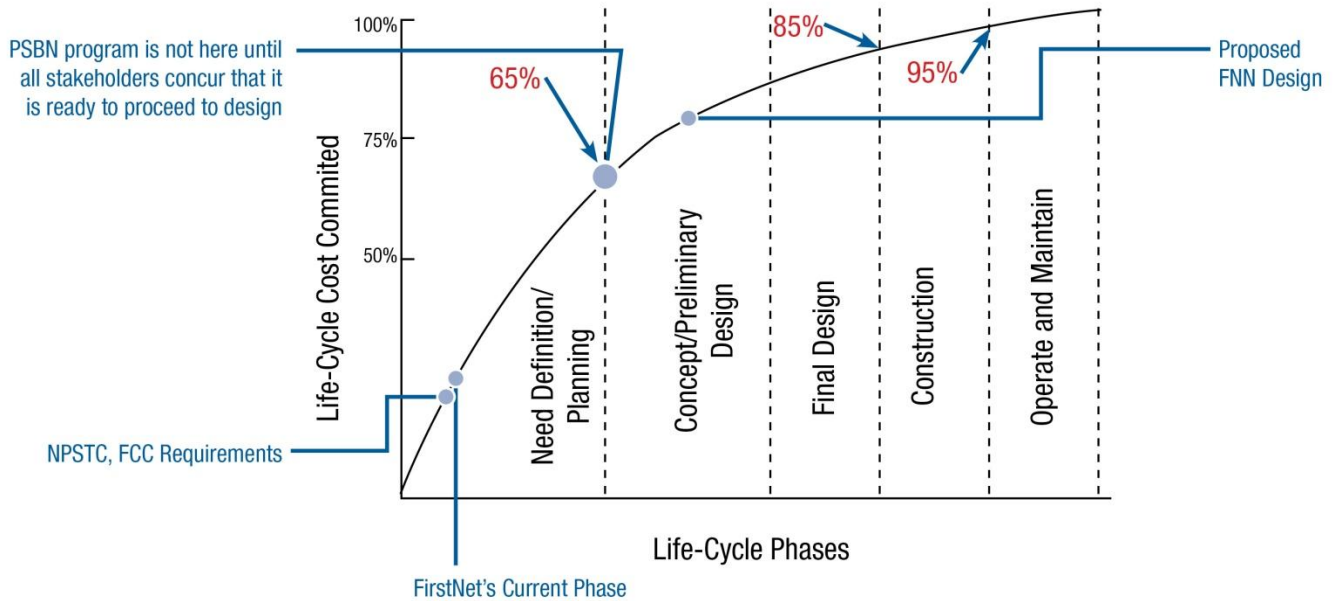


Figure 1: Optimal Planning Mitigates Risks of Failure (Source: Blanchard, B.S., Design and Manage to Life Cycle Cost, Forest Grove, OR. MA Press, 1978)

Hire a Program Manager: The immediate next step is for FirstNet to hire a program

manager as the prime contractor. A program manager is explicitly authorized in the enabling legislation,

Section 6205(b) (1). A program manager can help ensure that all parties are communicating effectively, and serve as a “translator” between technical and user communities. A program manager will oversee system architecture and engineering, and will coordinate with public safety entities across the country.

As shown in Figure 2, a program manager is more than a management consultant, or an accountant; more than a systems expert or a contract specialist. A program manager is all of those things, but most importantly, it is

financially and legally accountable—accountable to FirstNet, accountable to those on the front lines in an emergency and accountable to the taxpayers. A program manager with full fiscal accountability will make sure that the financial component of this complex effort is in line—and will bear responsibility if it is not.

In a large, complex, system acquisition,

STEP ONE

is hiring a program manager as the prime.

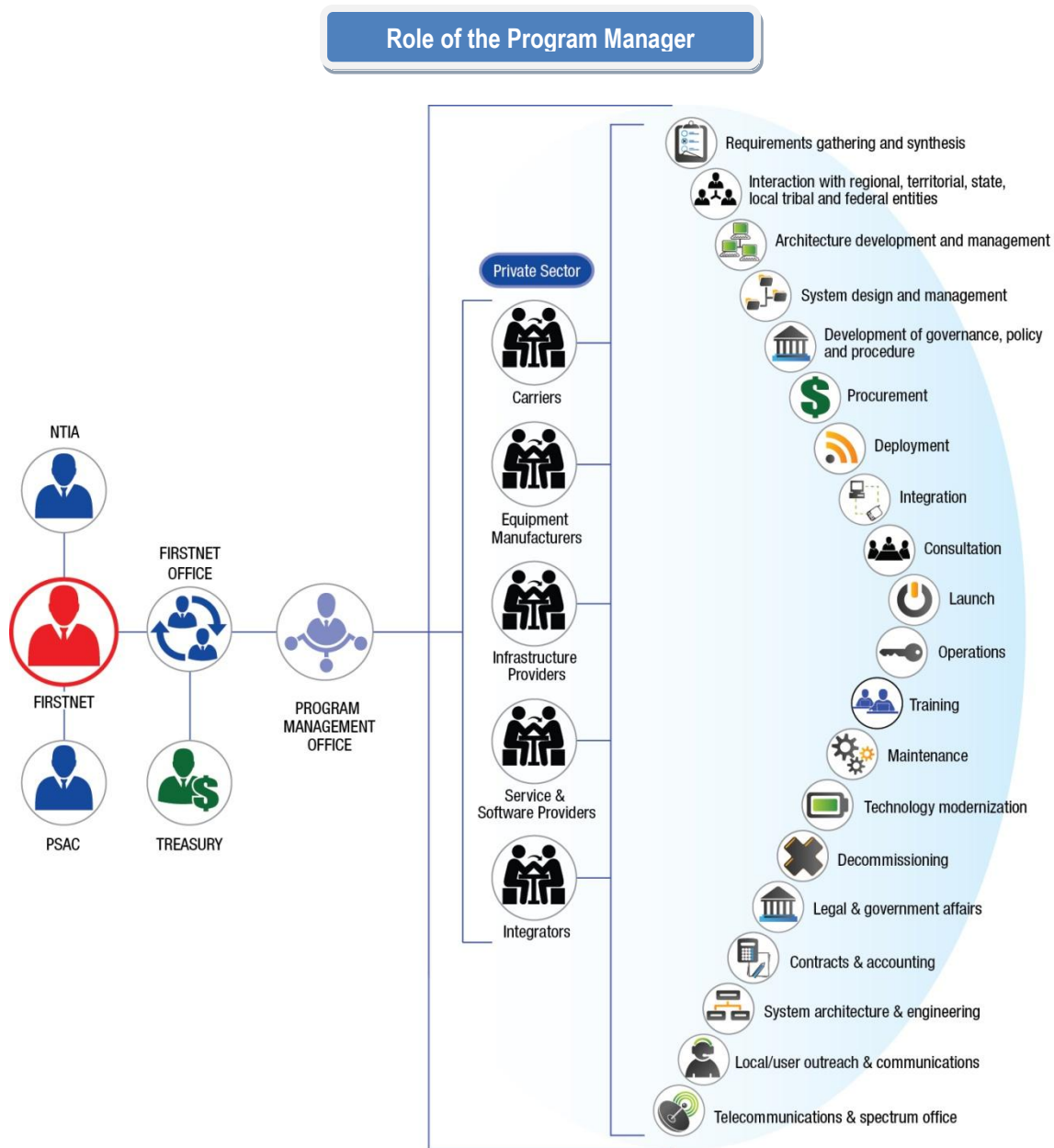


Figure 2: Proposed Program Manager Responsibilities

The program manager must be free of any organizational conflicts of interest (OCI). The industrial community that has a potential financial stake in the PSBN is vast, and the potential dollars on the line are significant. An OCI-free program manager is critical to maintaining industry trust, competition, and an open door to traditional and non-traditional players with potentially disruptive technologies that could significantly benefit the program.

As part of Textron Systems' process for understanding the requirements of the PSBN, we invested in a series of war games to bring together federal, state, tribal, and local governments;

industry; user communities comprised of police, fire, and rescue; and other first responders, to map out potential challenges and opportunities in developing the PSBN. Following each war game, we took the unprecedented step of making the findings publically available so that all interested parties—NTIA, FirstNet, end-users and even our competition—can benefit from our shared learning.

The road from ramp-up to deployment is long and full of obstacles. FirstNet needs a committed, experienced guide, equipped with resources and armed with feedback to ensure the ultimate success of the program. A program manager fulfills that need.

Establish the Public Process: FirstNet can achieve success by following a tried and true formula for developing large, complex systems. Our most significant recommendation is to select tasks and do them in order, based on the traditional formula for large program success (i.e. DoD 5000, Program Management Institute best practices, etc.). FirstNet sets the vision, but an experienced program manager should work with the board to scope the problem and take the necessary steps to the fulfill the board’s vision, including the first crucial steps—soliciting requirements from public safety users, evaluating the technical design of the network and related business models, and helping the board generate a FirstNet Nationwide Network (FNN) design concept that aligns all stakeholders. Developing and publicizing a clear and prioritized plan will help ensure that all stakeholders are aware, engaged, and supportive of efforts, helping to deliver upon the promise of the PSBN.

Practice Transparency: FirstNet has observed, and most would agree, that developing the PSBN is not necessarily a technology challenge, but is an organizational, financial, governance, and integration challenge. Beyond that, it is essential that FirstNet evolve and implement a process that permits the various stakeholders to participate in the conceptual and technical design in a transparent manner. These transparent approaches have been pioneered in large NASA and Department of Defense (DoD) projects using processes and tools to collect input from thousands of users (in some cases, more than 10,000 people) to produce detailed technical decisions and increase the speed to implementation.

Use Cost as an Independent Variable Design (CAIV) Approach: Based on our experience as both a government contractor handling billions of dollars of federal money and a commercial products provider harnessing risk to achieve profitability, we bring a unique perspective to the contrast between reporting to the American public and being accountable to our corporate shareholders. There is a critical difference between spending the taxpayers' money versus the money of a risk-aware investor or stockholder, and FirstNet has the unique challenge of achieving profitability while adhering to the strict requirements that come from spending government funds. The plan, finances, and value of the PSBN must be clear at all times to the American public. For this reason, FirstNet should employ a program manager that has experience in the principles of the CAIV methodology. This design and acquisition process, evolved over the last decades in the DoD arena (but widely used), is especially useful when cost constraints are challenging and scrutiny is high. Using CAIV, the degree to which network and public safety user requirements are satisfied can be interpreted and balanced against a design concept. FirstNet would be able to explain, in detail, why decisions have been made that may be to the perceived disadvantage of some elements of the stakeholder community but are necessary to protect the system as a whole. Our experience shows us that taking the time up front to simultaneously negotiate performance and cost almost always results in shorter timelines and lower program costs. Expensive re-directs based on changing (or newly discovered) requirements can quickly lead to ballooning costs detrimental to the program. (Please refer to Figure 1).

The plan, finance, and value of the PSBN must be clear at all times to the American public.

Obtain Public Safety Buy-In: The PSBN holds great promise for the nation, but communities across the country may not be aware of FirstNet's plans for the network. State and local governments and first responders have already started to develop alternate solutions and in turn may

not support local leadership investing in PSBN. Without widespread buy-in, the PSBN will weaken. Broad public support at all levels ensures a strong, consistent, and truly interoperable network that meets the goals set forth by the 9/11 Commission. The key to obtaining the buy-in from public safety users who are the “boots on the ground” responders is to clearly and definitively show what the system will do, when it will be available, and how much it will cost at the user level. The PSBN must be shown to provide a better value than legacy systems. This value must be communicated early and often from FirstNet in order to obtain and maintain the commitment from the user community. Finally, execution must demonstrate that the user requirements are clearly understood and the PSBN is being delivered in a timely, high quality manner.

Promote Continuous Competition at Each Level of

the Network: Enabling open competition in the process of building out the network will encourage vendors of all sizes to lower bids and achieve the best value for taxpayer investment. Furthermore, strong OCI requirements and transparency rules will ensure competition is open and fair, and prevent anti-competitive deal making that could drive up the costs of the program. Although continuous competition holds the promise of keeping costs low, a program manager can prevent extended and lengthy bid cycles from introducing delays that drive costs back up. In summary, open competition will enhance the financial viability of the program.



Utilize Effective Contracting Vehicles: FirstNet should fine tune contract vehicles to its best advantage. Contract vehicles such as state or regional Indefinite Delivery Indefinite Quantity (IDIQ) contracts can provide a highly accelerated process to pre-qualify bidders for work in a particular region. These bidders can then compete for work packages/task orders in a competitive arena. In addition, the IDIQ process can be used to pre-qualify vendors in the event of a disaster. Using IDIQs, service level agreements and roaming agreements could be based on models of disaster scenarios that

can accurately predict regional needs. These models can predict the cost to provide the agreed upon service level. Each region should have targeted, cost-controlled service level agreements that are subject to open competition. Then, in the event of a disaster, costs can be contained and service levels maintained.

Leverage Existing Assets: Significant investments have been made by all stakeholders in Land Mobile Radio (LMR) fiber backhaul and interoperable handsets, Long Term Evolution (LTE) equipment, towers and many other aspects of the nation’s network infrastructure. A qualified, independent program manager should be responsible for working with state, local and tribal governments, public safety users and commercial entities to leverage existing infrastructure to the utmost, expanding the geographic footprint of the PSBN, and decreasing the cost of the build out. A program manager with no bias from previous projects or financial linkages to the owners of the existing assets is the only effective negotiator for the complex working arrangements that will be required to harness the value of these assets. For example, effective contractual arrangements will have to be made by FirstNet (via its program manager) with both Crown Castle and American Tower, among others. The unbiased program manager should make decisions on the reuse of sites, towers, equipment, and services based solely on their benefit to PSBN, and should not be encumbered by legacy commercial and governmental relationships that can drive up costs.

Manage Change: The push for commercial off-the-shelf technologies in the legislation authorizing the PSBN was done out of concern that specialization within the PSBN will drive up the costs of the entire system—a situation that has undone many systems previously procured or operated by the federal government. The private sector innovates quickly, and the PSBN can benefit from existing and future technologies without developing costly proprietary systems. Nowhere is this more evident and dynamic than the software industry. FirstNet must position itself and the PSBN to embrace this dynamic.

RESPONSE TO THE FNN CONCEPTUAL DESIGN MODEL

It is challenging to provide complete and impactful commentary on the FNN conceptual design without better understanding the process, context, and rationale for selection of the presented design. The notional design offered by FirstNet may be a good solution, but we do not have the proper context to fully evaluate or assess it. Our analysis of the model revealed the following elements (among others) that impede a full evaluation of the proposed FNN conceptual design model:

Evaluation Criteria: The evaluation criteria used to select the presented design are unclear or unknown. In particular, the weighted criteria, if any, that were used, and other alternatives (other than a single commercial carrier model) for the evaluation are unidentified.

Public Input Process: There is no public visibility into what requirements were used in the design process that resulted in the proposed network design.

Compliance with Recommended and Mandatory Requirements: It is not clear to what extent the proposed system design has been evaluated and complies with the Federal Communications Commission (FCC) Interoperability recommendation, which has both mandatory and recommended requirements, or any other set of requirements such as those set forth by the National Public Safety Telecommunications Council (NPSTC). For example, are all mandatory and recommended requirements satisfied by the FNN conceptual design model? Only minimum requirements? Or a mixture of the two?

Entire System Rollout Assumption: Based on our lack of visibility into the decision process, it appears that the selection was made on the assumption that a simultaneous nationwide rollout was mandatory. It is not clear that any other rollout assumptions, such as a sequential rollout of geographic coverage or functionality (or both), was considered and rejected, or simply not considered. If

a CAIV process had been conducted, the public could view the trade-offs between cost and performance, and understand the context of the proposed solution.

Unclear Value of Network Layering: The proposed model appears to assume that all the redundant networks are operational in order to achieve the availability of the system. This does not reflect reality for emergency situations, when some networks may have been destroyed. It may not reflect a viable general model for much of the country, where coverage by multiple existing carriers may or may not exist. Use of Sites-On-Wheels/Cells-On-Wheels (SOWs/COWs) will also have to be redundant in a disaster area to provide the necessary high availability after a disaster eliminates the terrestrial wireless assets. It is unclear if that is what is intended. This is especially critical as the period of time immediately post-disaster is when public safety will have the greatest need for the PSBN.

Unclear Network Assumptions: The model, as presented, also does not discuss how the multiple networks are to be used; i.e. in a failover mode, or in a load balancing mode, or in a cost minimization mode.

Network Control: If multiple modes are to be employed, the presentation does not discuss how the command and control of the network is to be done, and who makes the command decisions controlling the modes. For example, it is likely that significant controversy and a difficult debate among users of the PSBN would result from competing, legitimate views among stakeholders in determining who has control of the modes. Fiscal controllers may have a different view than emergency personnel of how the network should be managed nationally, regionally, and locally responding to an event.

Unclear Public Safety Requirements: The NPSTC Local Control Task Group and the FCC Technical Advisory Board for First Responder Interoperability have worked tirelessly over the past three years to define requirements for this network. Textron Systems was proud to be a part of these activities at NPSTC, and we recognized the strong contribution of a set of first responders who gave their time and effort to provide user validation for the network requirements. With the nomination of the

FirstNet complete, these results now serve as a starting point for the requirements generation needed to design the FNN. Textron Systems feels that these results should now be exponentially expanded to include a much wider set of public safety contributors, who have disparate and highly localized needs.

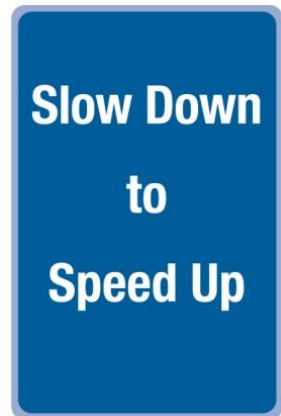
At each of the three Textron Systems' war games, the users attending (representing public safety entities of different sizes and locations) highlighted that they were unaware of the ongoing NPSTC solicitations for requirements. In further discussions with our customers in the public safety community, we have heard a reoccurring theme that public safety users are concerned that their interests are not being integrated into FirstNet's plan. This message highlights the need for FirstNet to provide PSAC with tools and resources so that **all** public safety users can contribute to the vetting of requirements. FirstNet should make it possible for public safety users to provide their input in the course of their busy lives and schedules, and should look to its program manager for modern, creative ideas for the implementation of this assignment.

Small Requirement
Changes like
Classified
Environments
can lead to
**Ballooning
Costs**

Further, most of the requirements stated in the documents are technical instead of being performance-based. It is left to the reader to understand how these requirements translate to performance in support of public safety missions. Most public safety personnel are not equipped to translate technical specifications to mission performance, making it difficult for users to understand whether the requirement meets their needs or not.

Some requirements can have unintended impacts on cost that may not be identified. For example, on occasion the PSBN may carry classified information for federal users, not just Personally Identifiable Information (PII). Having classified information in the system core brings a whole series of physical and operational protections that are not necessarily functional in nature but would have initial capital and operational cost impacts.

Security Requirements: Security planning is a key element of the PSBN. The PSBN will be used in scenarios where system security is of utmost importance to its functionality, especially as this national network for first responders is an ideal target for bad actors. Ensuring that the network architecture provides continuous systems security, including the ability to carry classified information, is essential, but could prove costly if added after network design is done. Security design and its continuously changing nature must be considered up front as a primary design element to control cost.



Our Recommended Solution: Take the time up front to build a solid foundation for the program. We understand FirstNet’s desire to move to implementation quickly, but clarity and volatility of system requirements are significant factors in the success of large, complex programs like the PSBN. By fully vetting and stabilizing requirements before designing and deploying the network, FirstNet will better be able to meet the aggressive schedule desired by government, industry, and public safety communities. Without doing this first, FirstNet creates a risk for the program with three potential side effects:

1. Unclear and/or unstable requirements from public safety users increase the cost of the program due to hidden or misunderstood requirements, resulting in expensive redesigns, retrofitting, or unplanned upgrades of the system to meet minimum standards.
2. Delay of network deployment will increase the risk of low adoption by the first responder community who are anxious to have the network available for the next disaster. The political community cannot let this program fail and must meet its legislated mandate.
3. Perhaps, most importantly, poor requirements may produce a network that does not satisfy first responders’ needs. For example, the P25 digital radio communication standards permit industry to position itself to provide systems that leverage proprietary features, and as a result

are not interoperable with other systems, while still complying with the standard. This is a weakness in standards establishment, as public safety is clearly best served by standards that compel participants to meet the key needs of the users.

These side effects could best be avoided by collaboratively defining and vetting requirements up front. Once these requirements are understood and stable, network design can take place and tradeoffs made among cost, schedule, and performance for the diverse geographies and needs of public safety across the country.

FirstNet should invest in a process to ensure that a significant fraction of the user community can voice and evaluate their requirements for the network. This voice should take the form of performance-based requirements that are meaningful to public safety agencies and entities, and reflect the complexities of the real world interactions they face during their individual missions. In other words, in the midst of an emergency, what do they need from the PSBN to get the job done? But how does one collect this type of data in a meaningful way? Technology and new advances in data collection provide the answer: crowd-sourcing public safety user requirements.



Gathering a large sample size of user requirements will lead to a properly sized and scoped network.

GETTING STARTED: CROWD-SOURCING USER REQUIREMENTS

Since having proper and validated requirements is critical to program success, Textron Systems has implemented two approaches to harness the knowledge and priorities of the approximately two million public safety personnel. With a goal of sampling at least 10 percent of the public safety users, these approaches enable PSBN users to directly communicate their needs and expectations to PSAC and FirstNet.

The first approach employs a strategy of interactive crowd-sourcing through the use of a wiki. Simply put, a wiki is a website that invites users to add, modify, or delete content. Stakeholders of the first responder community, including police, fire, EMS, incident commanders, interagency collaborators, telecommunications providers, and others, may help to contribute and organize the capability requirements of the network. Users work on the wiki to outline typical scenarios representing the activities and challenges that first responders face in the field. Concurrently, telecommunications providers may provide experiential knowledge based on technical expertise about the implementation and maintenance of communications networks applicable to the various scenarios. Textron Systems has deployed the first version of the PSBN wiki at: www.ConnectingFirstResponders.com.



The second approach puts contributors to the requirements virtually in the shoes of the first responder by way of a first responder “interactive game.” As laid out in Figure 3, the game places many simultaneous players in scenarios that range from normal daily operations to natural disasters and terrorist attacks, while they compete with one another to perform the duties of the first responder in the game. This could include fighting crime, rescuing injured civilians, protecting property, and any other role a public safety user chooses to input. In the game they will request access to various types of information, coordinate with players in many roles across the community, and in the process “virtually” use the PSBN. The data, activities, responses, problems, and creativity of the players will be tracked to assemble a thorough inventory of potential uses of the network and prepare for future needs that will prompt requirement updates if not addressed. The capabilities of the PSBN network in the game are also modifiable, so that data on what various players deem an “ideal” network can be collected. In this way, threshold- and objective-level performance measures can be determined for the PSBN design and operation.

Innovative Tools, Like a Disaster Response Video Game, Could Enable PSAC to Communicate Directly with Their Users and Gather Requirements Effectively

PSBN User Scenarios



PSBN USER REQUIREMENTS

Figure3: Crowd-Sourcing User Requirements through an Interactive Game Makes it Easy for the Entire Public Safety Community to Contribute to the PSBN

The PSBN is a critical system that has the potential to impact every American life. Ensuring the system meets the needs of our diverse nation and the men and women who protect us will require a significant effort to capture as much input as possible. Crowd-sourcing the requirements and leveraging the creativity of the public in this fashion will enable FirstNet to provide a venue for users to contribute and leave their mark on the network. This allows telecommunications providers to influence requirements based on the cost impact of various network design approaches and develop comprehensive requirements data directly derived from the performance needed by public safety.

A MUTUALLY SUPPORTIVE BUSINESS MODEL AND TECHNICAL APPROACH

The business requirements are of equal importance to the technical requirements, and coordination of the business model to the technical approach is essential to the success of the program.

The business model and technical model must leave room for the introduction of disruptive technologies to be incorporated, as these can provide order of magnitude improvements in performance at dramatically lower cost. For example, Beatty and Co., a small, woman-owned business in San Diego specializing in thin and zero client technology, has developed a method to make a smartphone into a stateless device that retains no data, is transparent to device type, and



Disruptive technologies
can significantly reduce costs and add previously unimagined capabilities.

provides a personalized desktop via highly secure means at very low cost. When combined with a single chip type of end-user device such as the iPhone 5, the Beatty operating system (OS) offers the possibility of a purely software defined radio end-user device, which means a single device can be used over the PSBN and the commercial networks by changing only the software settings on the phone and authenticating the PSBN user. This is an example of what could be a key enabling technology for the

PSBN, which would positively impact not only the cost of the system, but would significantly improve security as well.

All data thus far have shown that the minimal funding available to FirstNet, \$2 billion, must be supplemented through other revenue sources in order to fulfill the requirement of the legislation and provide FirstNet the flexibility to implement technical and programmatic solutions that will develop in the future. So the question becomes, how quickly can revenue be generated by the network?

Furthermore, how can the allocated \$2 billion be spent in such a way that the system can operate and grow to complete all requirements, especially if they are not met by the initial operating design?

Public-private partnerships are essential to the success of the program. Furthermore, what must be acknowledged is that telecommunication carriers currently serve a large proportion of the public safety community, many of whom, to sustain the PSBN development, must migrate to the PSBN. Some large carriers are opposed to the use of the network by what they term, “secondary users,” or non-core public safety users, on the grounds that it significantly undercuts their subscriber base. If this were to happen, the network would be set up as a “competing commercial network,” a paradigm that would impede the success and slow the development of the public-private partnerships essential to the success of the PSBN. A business model of a competing commercial network is not a financially viable model, given the \$2 billion funding constraint, along with the size of the core subscriber base and the core mission of the PSBN. We have identified three possible approaches to augment FirstNet’s available funding for the PSBN. As shown in Figure 4, various revenue streams could be employed in a variety of combinations.

To be flexible, the board could match geography and subscriber needs to the varying revenue stream combinations, and then periodically evaluate and recompute the contracts in place for each region. Then, an optimal mix of revenue and services can be provided to each participating region.

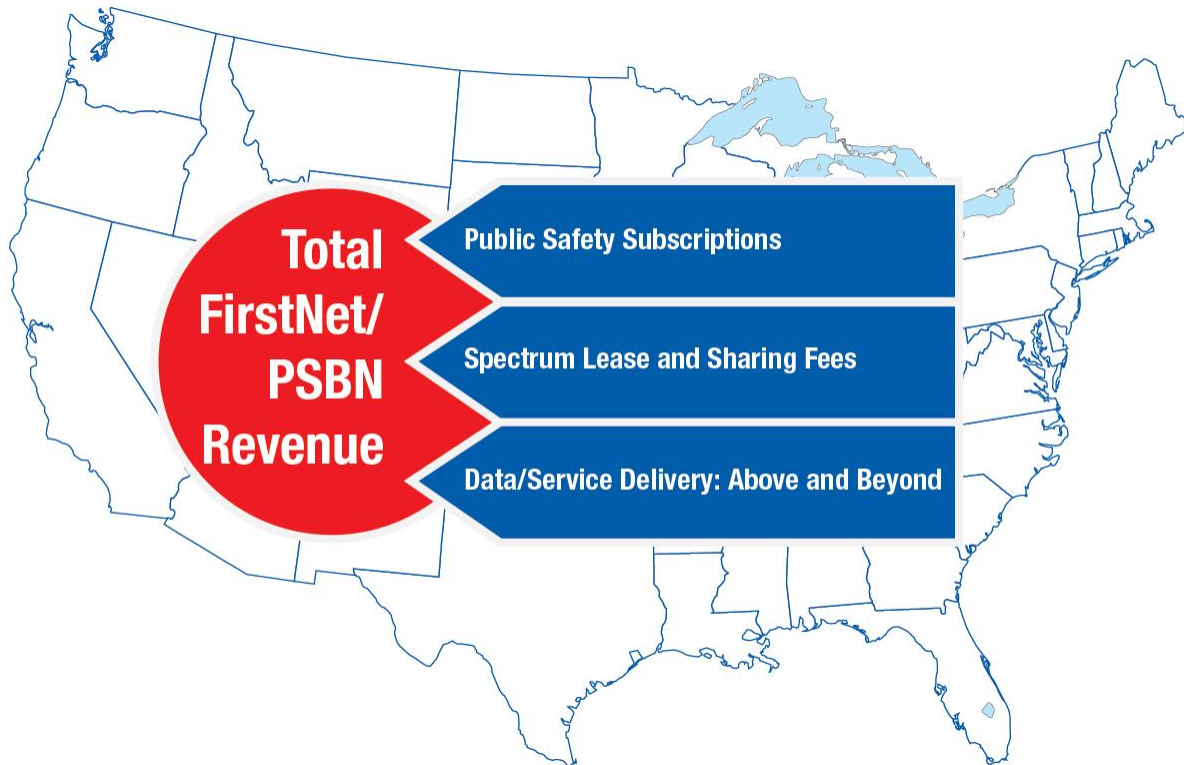


Figure 4: Possible FirstNet Revenue Combinations

Revenue Stream 1: Public Safety Subscriptions. Attracting public safety users and generating subscription revenue is essential to the success of the PSBN. Because the PSBN is asking state, local, and tribal governmental entities to make a voluntary change, a strong PSBN value proposition must be presented to public safety. Public safety most certainly has financing concerns. If new spending by a public safety local agency is needed to procure PSBN service, many officials have indicated that they will need 18-24 months prior to the actual expense date to ensure that their local budgets can be adjusted. Moreover, no law compels public safety users to utilize the PSBN solution. As time progresses, other technical and business solutions may be presented to them. State, local, and tribal communities influence each state government’s decision whether to opt-out via the legislatively directed process or to pursue different solutions outside of the PSBN. Ultimately, the PSBN cannot cost users any more than they are paying today—and there is no reason it should.

Revenue Stream 2: Lease and Use Spectrum Agreements. Spectrum sharing contracts with carriers can certainly be a source of revenue. Some carriers have suggested that

spectrum sharing is impractical, and that it would imperil the foundation of the PSBN, i.e. uncontested access by public safety. However, it may be a useful tool for FirstNet in some areas of the country to develop revenue to extend and enhance the PSBN. These will be complex arrangements to negotiate, but could be lucrative in support of the system.

Revenue Stream 3: Data Fees. There is an opportunity for FirstNet and wireless carriers to provide new and innovative services on the PSBN that can be marketed and provided as add-ons for interested public safety users. These new products for public safety could be created and marketed by carriers or other service delivery partnership third parties who would remit a contractually agreed upon amount to FirstNet.

ADDITIONAL COMMENTS: IS IT TIME FOR AN APP STORE?

As an initial comment, it is important to delineate between apps needed for the FNN to work versus apps that simply create additional capabilities on the system. FirstNet should take clear and early responsibility for apps needed to make the system work. These applications would be anything impacting the quality of service, quality control, accreditation, authorization, and security for FNN. It might also include data routing apps stemming from public-private agreements on spectrum sharing or interconnectivity requirements. These apps that ensure the functioning of the system should be pre-loaded on devices meant for the network. They should not be confused with applications that provide mission-related information and services for the user.

In response to the NOI apps question: FirstNet would be well served by leveraging the efforts that are ongoing in the DoD and other government arenas. For example, the Navy has embarked on the development of the Afloat Core Services for its Consolidated Afloat Networks and Enterprise Services (CANES) program, which provides the data interoperability framework and environment for its legacy and new applications, and the intelligence community has created the Defense Intelligence Information Enterprise (DI2E), which has as one of its principal goals the development of next generation

architectures to permit the large scale interoperability of applications. Both of these examples (there are many more past and ongoing efforts within the government) have the benefits of access to the commercial technologies available for data sharing, but also access to the world's best expertise on security for this type of enterprise. The federal government as a whole has been studying, experimenting, and employing the evolving foundations that must underpin a viable app marketplace for public safety. FirstNet, by virtue of its makeup and the presence of the DoD CIO on its board, is in an ideal position to leverage the multimillion dollar investments and years of time that have been and are currently being dedicated to the problem. FirstNet, given its generally accepted fiscal situation relative to the magnitude of its task, should be looking to spend its resources elsewhere before trying to take on this issue on its own.

In addition, it should be possible for FirstNet to develop the environment where industry has a business reason on its own to provide the necessary cataloging and validating, such that FirstNet does not have to fund or support the "app store" itself. Achieving this kind of environment should be the goal and direction of FirstNet rather than trying to take on the role itself. For example, there is no guarantee that app stores are going to be the best means of functional capability dissemination for the future. Depending on the paths eventually evolved by the commercial market place, and the potential deployment of disruptive technologies such as zero client end-user devices, other market forms such as cloud-based desktop provisioning are likely to supersede today's methods. We see this today in the defense marketplace, where cloud-based computing and remote desktop applications compete with more traditional "thick clients", an architecture in which tasks are not executed on a server in the cloud, but are actually executed on the device facing the consumer, such as a desktop. Analogously, a smart phone with a collection of apps and a data-service is really no different from a traditional desktop "thick client". Vast resources have been dedicated to the development of these service-oriented architectures over the last ten years, and there is still no widely accepted standard for these in the

military (which is a much less diverse environment than public safety). In other words, a closed app ecosystem may have the potential opportunity for FirstNet to commit to a black hole of funding. With competing architectures, the one thing we can count on is that this market dynamic will evolve. FirstNet should be positioning PSBN to embrace the evolution

Our Recommendation: Develop an App Ecosystem. The user community should drive the development of applications. Their participation in the PSBN will ultimately determine its success or failure. That participation is by no means assured, and an app store highlighting features that public safety had no role in developing will do little to drive their participation. Textron Systems' PSBN war games illustrated this dynamic repeatedly. Participating law enforcement officials continually voiced reluctance to relinquish their legacy emergency systems that they themselves had a hand in developing. In fact, many agencies develop their own applications that are highly tuned to their local needs.

FirstNet should encourage the development of an open ecosystem at this stage rather than predetermining any particular app outcome. An open process would allow the user community to adequately communicate its ideas and requirements. A closed app market, on the other hand, has two additional drawbacks that could be problematic. First, it is cost prohibitive for FirstNet to undertake exhaustive checks on each app. In addition, a closed system stifles creativity in the developer community—a community whose expertise should be brought to bear on all of the public safety community's needs.

Moreover, and as appealing as it sounds, there is currently no “killer app” that will drive law enforcement and emergency responders to shift from their legacy systems to the PSBN. Just as commercial users couldn't fathom a live GPS mapping app before the smart phone's invention, the public safety and industry communities have no way of comprehending today what capabilities the PSBN will provide tomorrow. Commercial spectrum leases have limited bandwidth in comparison to

Band 14. The development possibilities on Band 14 are inherently different than commercial because of the opportunity to use greater bandwidth.

CONCLUSION AND NEXT STEPS

Textron Systems proposes a “slow down to speed up” approach that will facilitate FirstNet’s early wins, get the program on track, and propel it forward to success. As we have outlined throughout this NOI, many questions remain unanswered. Before FirstNet can seek productive input on the design of the FNN, the development of an app store, or other proposed questions, FirstNet must take a step back, connect with end users and ensure the right foundation for success is built now to avoid costly missteps later on.

The immediate next step is for FirstNet to hire a program manager as the prime contractor. Once in place, the “honest-broker” program manager will guide the way through the process by providing an experienced view to each of FirstNet’s many responsibilities. This process should be completed by the end of the first quarter of 2013.

The program manager’s most important initial step is to help FirstNet connect with as diverse and large a range of its customers as possible – the actual users of the PSBN – to best understand the necessary public safety requirements. These requirements need to be the compilation and prioritization of a large sample of the diverse public safety community. We have suggested two means to do that by harnessing the power of crowd-sourcing in this document, but there are other tools as well.

These requirements, expressed in public safety operational terms, would then be translated to verifiable technical requirements and network designs by the program manager, leveraging the skills and knowledge of commercial industry with contributions from standards bodies. In parallel, the program manager, with the support and guidance of FirstNet, should develop viable business cases and arrangements that are congruent and mutually supportive of the technical solutions. Then the program

manager, again via guidance and direction from FirstNet, should establish an open, continuously competitive environment for implementation of the designs in a structured manner across the country. This can be done using a variety of contracting approaches, which can greatly accelerate the timelines for network rollout. Textron Systems has prepared a sample request for proposal (RFP) for a program management organization capable of executing the above steps. This RFP is located at www.ConnectingFirstResponders.com.

The sequence of events described here follows the basic tenets of successful large scale projects derived from decades of experience. Textron Systems agrees that speed is of the essence for the PSBN and commends the sense of urgency demonstrated by FirstNet. However, hasty steps taken without harnessing the vast inherent knowledge of the diverse public safety community, the technical knowledge and creativity of industry, and the organizational discipline of a single accountable entity will result in false starts, passive and active opt-outs, and excessive costs—any and all leading to a failure to achieve the PSBN objectives. To ensure success, FirstNet needs to slow down to speed up.

For more information on PSBN and FirstNet, please visit Textron Systems' website dedicated to this effort: www.ConnectingFirstResponders.com, and click the hyperlinks below to the following resources:

- [Draft RFP for FirstNet Program Manager](#)
- [Resource Packet for FirstNet Board Members & Key Stakeholders](#)
- [Proposed Timeline for Roll Out](#)
- [Textron Systems' Wiki for Requirements](#)
- [Results of Textron's War Game #1](#)
- [Results of Textron's War Game #2](#)
- [Results of Textron's War Game #3](#)
- [VIDEO: Textron's War Games](#)
- [VIDEO: Why Textron](#)
- [VIDEO: The Promise of the PSBN](#)