



SUMMARY

Purpose of this Document

The State of Minnesota is pleased to provide our response to FirstNet’s Request for Information for Comprehensive Network Solutions dated September 17, 2014. It was prepared in close collaboration with State, county, local, tribal, and private stakeholders and represents the collective recommendations from the State of Minnesota and the Statewide Emergency Communications Board.

We applaud FirstNet’s proactive efforts to solicit the opinions and recommendations from a broad base of solution vendors, the academic community, knowledgeable consultants and other individuals, and most importantly, from the government stakeholder community who will benefit the most from the successful deployment and operation of a robust and sustainable broadband wireless network dedicated to public safety.

The State of Minnesota has been actively engaged in advancing wireless public safety broadband communications within our state. We have gained important insights and experiences over the past three years, and most recently in managing outreach, governance and requirements gathering over the course of the State and Local Implementation Grant Program (SLIGP). We have achieved extensive participation from state, local and tribal stakeholders and we are proud to say that our response represents the collective input from a diverse group of rural, metro and tribal public safety focused individuals.

The geography of the State of Minnesota incorporates broad rural areas of farmland and dense forest together with densely populated Twin City metropolitan areas and a variety of mid and small cities as well as 11 federally recognized tribal governments. We share an extensive border with Canada and the port city of Duluth is the world’s largest inland port. We believe that our State represents a microcosm of the diverse geographic challenges that FirstNet faces in designing and deploying the wireless broadband network. As such, we take great pride and are hopeful that in articulating our response to the RFI that we will provide meaningful information and advice to benefit FirstNet and the nation as we collaboratively pursue this important endeavor.

Key Points:

Following are key points including in our response, ranked in order of importance:

- **FirstNet must establish a measurable minimum standard for buildout in rural areas.** Based on our experience, we recommend a specific percentage of each county. See pg. 5.
- **We are concerned that FirstNet did not include the State and FirstNet consultation as one of its core objectives.** We feel this is one of FirstNet’s principal duties under the law and should be listed as a core objective. See pg. 4.
- **FirstNet’s preliminary metrics defined under its core objective for “System Reliability and Restoration” do not meet public safety needs in Minnesota.** Specifically, we believe that FirstNet’s targeted throughput figures are not sufficient. See pg. 3.



- **Coverage is King.** Several of FirstNet’s prompts in its RFI focused on potential areas of compromise to manage costs and buildout timelines, particularly with respect to reaching Initial Operating Capability. We believe that Minnesota stakeholders will not compromise on coverage and will hold FirstNet to a very high standard on coverage offered. Any potential compromises will have to be made in other areas.
- **FirstNet needs to provide states with an SLA.** We propose the following initial metrics for consideration:
 - Cell sector or per-user minimum throughput
 - Geographic coverage
 - Availability of Service
 - Response window for network problems
 - Acknowledgement of problem
 - Repair of problem
 - Preventative action
 - Time for deployables



DETAILED RESPONSE:

FirstNet Statement of Objectives

Generally, we concur with FirstNet’s stated objectives. However, as detailed below, we disagree with the values provided for system reliability and restoration. Furthermore, we are very concerned that FirstNet has not included the integration of the state’s requirements and the overall consultation process as a stated core objective.

System Reliability and Restoration

FirstNet’s throughput values provided under “System Reliability and Restoration” would not qualify as “broadband service” in Minnesota. Minn. Stat 116J.39(b) defines “broadband service” as “any service providing advanced telecommunications capability and Internet access with transmission speeds that, at a minimum, meet the Federal Communications Commission (FCC) definition for broadband;” the FCC’s definition is 1 Mbps uplink/4 Mbps downlink¹ as of this writing. Minn. Stat 237.012 states that Minnesota’s statutory goal is to provide broadband access to all state residents at “minimum download speeds of 10 to 20 megabits per second and minimum upload speeds of 5 to 10 megabits per second” by 2015. The state’s broadband speed goals are technology neutral and we believe they are reasonable targets for FirstNet to provide to first responders with its wireless service. Throughput speeds currently available commercially are significantly higher than FirstNet’s target values, and will not be attractive to the user community that has become accustomed to the faster commercially available service. Furthermore, first responders should not be held to a lower service standard than the state’s residents.

We are unclear on what FirstNet means by “end-to-end availability”; it appears, from the reading, that FirstNet is committing to offer only 99% per-user availability for its services including internet access, network services and transport to public safety enterprise networks. FirstNet needs to clarify what it means by “end-to-end availability”. Our stakeholders, when polled, reject 7.2 hours of downtime per month as a service goal. We strongly encourage FirstNet to set a per-user Initial Operating Capability target (e.g., 99.99%), and a Final Operating Capability, “mission-critical” or “public safety-grade” target (e.g., 99.999%).

Minnesota has experienced several major outages affecting all telecommunications, including 9-1-1 service, telephone, cellular and internet service. In January 2010, a complete outage of all telecommunications followed a fiber cut for a large portion of the “arrowhead” region of the state and over 5400 square miles of geography.² This outage lasted for over 12 hours.³ A similar 8-hour outage occurred in Carlton County, Minnesota in 2009.⁴ In both cases, the service provided would have met and exceeded FirstNet’s proposal for 99% “end-to-end availability”.

State Consultation

¹ See FCC Sixth Broadband Deployment Report, GN Dockets 09-137 and 09-51; FCC 10-129.

² Lake and Cook counties were affected by this outage.

³ Media report: <http://www.mprnews.org/story/2010/02/03/north-shore-phone-outage>

⁴ Media report: http://www.twincities.com/ci_12313149



We are very concerned that State Consultation is not included as one of FirstNet’s Core Objectives.

The State and FirstNet consultation is one of FirstNet’s principal duties under the law⁵, an essential part of FirstNet developing a sustainable product that its market wants and the central purpose of the \$116.5 million NTIA State and Local Implementation Grant Program (SLIGP).⁶ FirstNet has committed to expend substantial resources into its state consultation program, but has failed to list this consultation as a core objective of the organization. Doing so may inadvertently undermine stakeholder belief in the consultation process.

Accordingly, we strongly recommend that FirstNet adopts a core objective **to successfully complete the consultation process with U.S. states and territories** in such a manner that facilitates its remaining core objectives.

⁵ See specifically US Middle Class Tax Relief and Job Creation Act of 2012 Sec. 6206(a)(1), Sec. 6206(c)(2)(A) and (B)

⁶ See NTIA State and Local Implementation Grant Program, Notice of Federal Funding Opportunity, pp. 4-21.

Available at: http://www.ntia.doc.gov/files/ntia/publications/sligp_ffo_02062013.pdf

Rural Buildout Milestones:

FirstNet must establish a measurable minimum standard for buildout in rural areas. We make this recommendation to (a) best manage the relationship between FirstNet and its clients, (b) ensure a high rate of adoption, and (c) satisfy FirstNet obligations under the Act⁷. We make this observation based on the State’s experiences with a similar program, the buildout of the Allied Radio Matrix for Emergency Response (ARMER).⁸

Until the commitment was made to build out ARMER at 95% in each county statewide with a minimum of four (4) voice channels per site, ARMER participation and interest throughout rural areas in the State of Minnesota was very low. Once this commitment was made, jurisdictions throughout the state began rapidly adopting the service from the years 2010-2014 until, as of this writing, all but two (2) counties in the state of Minnesota are using or plan to use the ARMER system for primary public safety communications (see Figure 1).

This *measurable* minimum standard is essential to the ability for the State to market the ARMER service as a viable option and for managing governance and funding issues between multiple units of government across diverse geographies within the State. First, there is a reasonable assumption that the service will provide adequate coverage, as the State is committed to covering 95% of the county with four (4) voice channels. If there are coverage gaps, local units of government have the option to invest in additional voice channels or additional sites—there is rarely meaningful protest that the State has not built out the network adequately, as it has met its agreed-upon obligation to provide coverage at 95% of geography with four (4) voice channels.

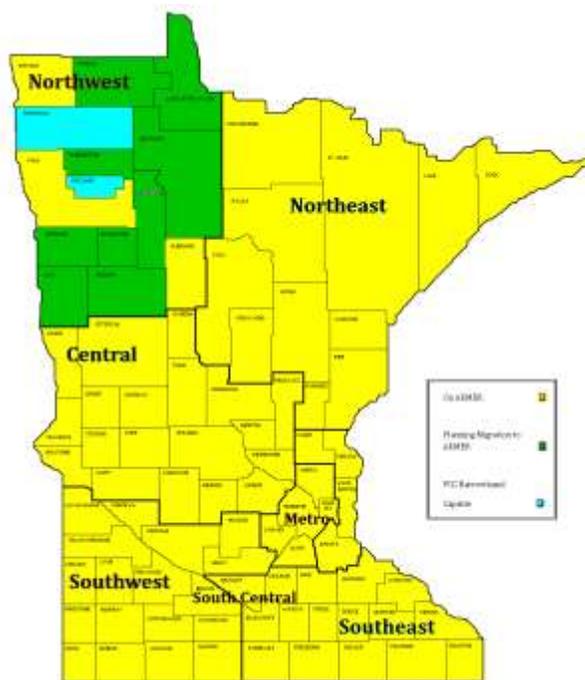


Figure 1: ARMER Adoption as of October 9, 2014

Accordingly, we strongly recommend that FirstNet negotiates a measurable minimum standard with each of its state clients through the consultation process. In rural Minnesota, that expectation will be based on the State’s experience with ARMER, which is that 95% of each county has mobile coverage and capacity sufficient to support four (4) concurrent users.

FirstNet will not be able to avoid a comparison to ARMER by its stakeholders and customers in the State. That expectation is 95% geographic coverage in each county. The State is not presenting this figure as an inflexible requirement at this time, but we anticipate the stakeholder community will be very disappointed in the service if offered anything with less coverage than ARMER.

⁷ See Middle Class Tax Relief and Job Creation Act of 2012, Sec. 6206 (b)(3). FirstNet is required to meet “Substantial Rural Coverage Milestones” not defined in the Act.

⁸ Statewide, trunked Project-25 radio system operating on ASTRO25 platform. As of this writing, 96% of sites are on the air. More information available at: <https://dps.mn.gov/divisions/ecn/programs/armer/Pages/default.aspx>



State, county and local jurisdictions may well be interested in making additional investments into the network—assisting FirstNet in achieving its challenging demands of providing service equal to or better than its commercial partners. However, it will be difficult or impossible for FirstNet to compel those investments until FirstNet has made a reasonable and measurable obligation and has expended resources to meet the commitment.

Providing Ubiquitous Coverage, and Cost-Benefit Tradeoffs

Coverage is King. The State appreciates the substantial investments that ubiquitous, nationwide coverage will require. However, the State has substantial coverage through commercial carriers today, including a near acceptable level of in-building coverage. FirstNet needs to meet or exceed that level of coverage in order to have a compelling product for public safety. The service *must* meet or exceed commercial carrier coverage to be marketable in Minnesota.

We assume that FirstNet’s service is going to include roaming and failover to a commercial carrier. In that respect, the State strongly desires to have some degree of control over how devices roam; e.g., to set specific throughput or signal strength thresholds at which the device will roam from one network to the other. Ideally, FirstNet will also facilitate handoff to and from commercial carrier partner networks.

Combining Core, RAN, and Leasing Across Entire United States:

FirstNet must have some mechanism that is responsive to the needs of the state articulated during the consultation process. While we decline to recommend a specific procurement vehicle or acquisition approach, we do observe that a state-by-state approach would afford each state the ability to provide substantial input into FirstNet’s procurement in each state, and, subsequently, FirstNet’s likelihood of a successful offer in that state. However, a state-by-state approach could dramatically slow the pace of procurement, as FirstNet would be required to negotiate 56 awards instead of one. We do however, strongly recommend that each state’s respective requirements be integrated into the Request for Proposal (RFP) process to ensure that vendors are fully aware of and commit to meeting these requirements.

We also note that a single nationwide vendor may not be the best solution for all markets. For example, a particular cellular provider may have excellent coverage in some high-profile markets in the country, but not in Minnesota. Selection of one nationwide vendor would speed deployments in those high-profile markets but would be a disadvantage to Minnesota.

Seeking a single, nationwide solution versus acting as an integrator:

While we will decline to recommend a specific business model, we do observe that **FirstNet has limited institutional experience or expertise functioning as a cellular carrier.** It is unlikely that FirstNet would be able to act as an integrator in a cost-effective manner as opposed to utilizing the resources available in the commercial market.

From a public safety perspective, we are most interested in being provided service that meets our requirements for priority, capacity, reliability, and interoperability. From the customer perspective, whether or not FirstNet builds the network through a major contractor should have no bearing on FirstNet’s goals and public safety requirements.



From the perspective of leveraging Covered Lease Agreements to maximize the value of the spectrum for reinvestment back into FirstNet, we believe that such leases should be offered on national, regional and local basis. We interpret “Covered Lease Agreements” broadly to include any assets or resources that can be capitalized, including spectrum, network capacity, network facilities and hardware including towers, shelters and backhaul; and any other assets. The State’s preliminary investigation into potential local partners in our state indicates that there are multiple entities, including utilities, rural Telcos, governments and others, interested in exploring FirstNet partnerships. FirstNet should balance the benefits of local and regional Lease Agreements in conjunction with national opportunities.

Priority and Preemption:

We require that the Statewide Emergency Communications Board (SECB)⁹ and regional governance bodies have significant control over network performance and configuration parameters, especially priority and preemption. We credit much of Minnesota’s success in communications during major, multi-agency incidents to the state’s robust governance structure and its comprehensive communications standards.¹⁰ While these standards presently apply primarily to land-mobile radios and in particular those used by ARMER, the SECB has recently been granted the authority legislatively to adopt and enforce standards for emergency calling (9-1-1), emergency alerting (IPAWS) and public safety wireless broadband. These standards cover issues ranging from standardized universal required channel configurations for radio equipment in the State, how radio equipment should be configured to manage roaming or site loading, how to request deployable assets, the degree of access media has to the network, and countless other activities that collectively promote and govern statewide interoperable communications. The standards are written by members of the community, debated and marked up in committee and vetted by a variety of representative bodies throughout the State. We feel that our communications standards make first responders in the state safer and more effective during major incidents. They are central to a culture that takes interoperability very seriously.

Our requirement is for a degree of local control where the governance structure has control over the configuration, operation and behavior of the network. We feel that real-time dynamic control over the network should be assigned conservatively; e.g., an individual dispatcher or PSAP should not have a meaningful degree of local control over how individual eNodeB sites operate or behave. It is our expectation that FirstNet will provide states the tools and guidance to facilitate local government management of priority and preemption and that at the state level, state’s will develop standard operating procedures and governance to manage and inform our statewide FirstNet subscribers of incident driven priority and preemption activities.

We do not feel that prioritizing data based on responder discipline in real-time will be manageable. It is more likely that the network should prioritize traffic based on data type. E.g., streaming video which consumes substantial bandwidth can be buffered and may be a good candidate for a lower priority, while CAD data updates consume short bursts of relatively little bandwidth, deal primarily with emergent data needs and may be a good candidate for higher priority on the network.

⁹ The Statewide Emergency Communications Board (SECB) is the oversight governance board within the State with responsibility to guide and direct interoperable communications initiatives and capabilities within Minnesota.

¹⁰ Available at: <https://dps.mn.gov/divisions/ecn/programs/armer/Pages/armer-standards.aspx>



FirstNet Evaluation of Existing Infrastructure

Valuation of existing infrastructure in each state is a central goal of the State and Local Implementation Grant Program (SLIGP) under Phase 2 Data Collection. States should be required to collect data on *all* suitable infrastructure—including commercially-owned and government infrastructure—in Phase 2 of SLIGP. This process should begin immediately so that the results can be used in state and FirstNet business plan development as well as the formulation of vendor proposals. Such assets may prove to be of significant value to perspective bidders and it is in the best interest of the overall procurement process to catalog these assets. Importantly, many of these assets are already hardened to public safety grade requirements, and while we recognize that some of the assets may not be usable or may be in certain situations challenging to enter into agreement to lease, these assets represent potentially significant value to FirstNet and represent investments already made by tax payers.

Minimizing FirstNet's Costs

FirstNet's best opportunity for minimizing costs is likely to work with commercial partners and government organizations to add BC14 RAN to existing sites. Not only does this reduce overall capital expenditures, it substantially improves FirstNet's time-to-market.

FirstNet should aggressively pursue revenue generation opportunities through covered leasing agreements. By building a nationwide public safety WAN, FirstNet can offer significant service to government organizations above and beyond wireless service, such as NG911 transport and secure database access. These assets should be leveraged to introduce additional capital to the network and to benefit public safety communications as a whole.

Our preliminary market research shows many interested commercial partners in the State of Minnesota, offering resources ranging from backhaul and tower sites to switching facilities and, in some cases, complete network solutions. However, we have few compelling offers from parties offering capital to help fund the initial buildout.¹¹ We recommend that FirstNet focus much of its public-private partnership research in Minnesota into identifying sources of additional capital.

FirstNet needs to work with device manufacturers and commercial carriers to introduce consumer devices to the market that operate on FirstNet spectrum. Potential spectrum lease or network access agreements are not going to be palatable to secondary user entities unless there is a critical mass of consumer devices capable of operating on BC14. As of this writing, no known leading consumer cellular handsets are capable of operating on BC14. We encourage FirstNet and Congress to aggressively pursue options to secure BC14 chip sets into all commercial devices.

Assuring Sustainability of the Service Post-2027

If FirstNet develops a sustainable service that provides good value, it is likely there will be congressional support to extend FirstNet's term. The ideal outcome is that FirstNet becomes self-sustaining and evolves with industry, and in achieving this level of success it will be self-evident that Congress should continue to support the service. Additionally, FirstNet should enter into Spectrum Leasing Agreements

¹¹ See Minnesota Initial Consultation Meeting Preparation Report, pp. 23-29.



and partnerships with network management entities that provide flexibility for renewable extension of contract, or dismissal for poor service with a manageable transition of “ownership” back to FirstNet.

To make the case that FirstNet’s service is of value to the community, FirstNet should measure its progress and subsequent service delivery by quantifiable milestones and metrics in a public report. In quantifying these milestones FirstNet should continue its ongoing dialogue with the states and solicit feedback from governing entities. These reports should be published not less than annually. Opt-out states should be held to the same public reporting requirements as FirstNet, and some provision should be provided should an opt-out state fail to meet the same milestones as the larger network.

Features that Will Drive Adoption

FirstNet needs to offer bandwidth and coverage at least as good as current commercial cellular carriers. Generally, our urban constituents are interested in exclusive bandwidth and may be interested in paying a slight premium for it. There is huge value in having exclusive access to priority spectrum. Rural constituents are primarily interested in FirstNet filling the coverage gaps that they have today. Commercial carriers provide a moving target; they will always offer a viable alternative to public safety, and they will always be improving the quality of their service in a competitive marketplace. FirstNet will need to keep pace with their benchmark to maintain its customer base into the future.

FirstNet is not entitled to Public Safety’s business, and many public safety organizations are pleased with the commercial data service and pricing schemes they are using today. While deploying commercial data is a significant expense for many organizations, public safety organizations have been able to secure support for funding commercial data based on increased responder safety, effectiveness and productivity. In order for agencies to justify future funding requests, FirstNet needs to provide a meaningful and measurable improvement over the commercially-available services that are and will always be a viable alternative for public safety.

Ensuring Reasonable Fees

FirstNet must establish a critical mass of guaranteed users. Because FirstNet’s operational costs will be relatively fixed regardless of the user population, its per-user costs will decline on a logarithmic scale as the population of users increases. Therefore the single most significant factor in achieving reasonable user fees will be achieving a critical mass of users. Once FirstNet reaches that critical mass there will be declining value in each additional subscriber. Below that point, however, it will be very difficult to make a business case.

Minnesota performed a high-level budgetary study in 2011-2012¹² showing that a public safety LTE network operator could achieve a rate reasonably competitive with commercial carriers if it achieved a critical mass of users. Minnesota’s break-even point from that study is shown in the Figure 2 below. A key objective of Minnesota’s work under SLIGP is to evaluate and update this business model in terms of the FirstNet service subscription.

It is important to note that the business model explored by this study was very different from that of FirstNet. Our model in that study assumed the State would build and operate a stand-alone LTE network

¹² Available at: <https://dps.mn.gov/divisions/ecn/programs/armer/Pages/studies-reports.aspx>

and would have access to its own infrastructure at little to no cost. Additionally, the implementation model is budgetary only and includes a number of assumptions and extrapolated data. However, this research, with these qualifications, demonstrates the feasibility of an initiative like FirstNet’s in Minnesota.

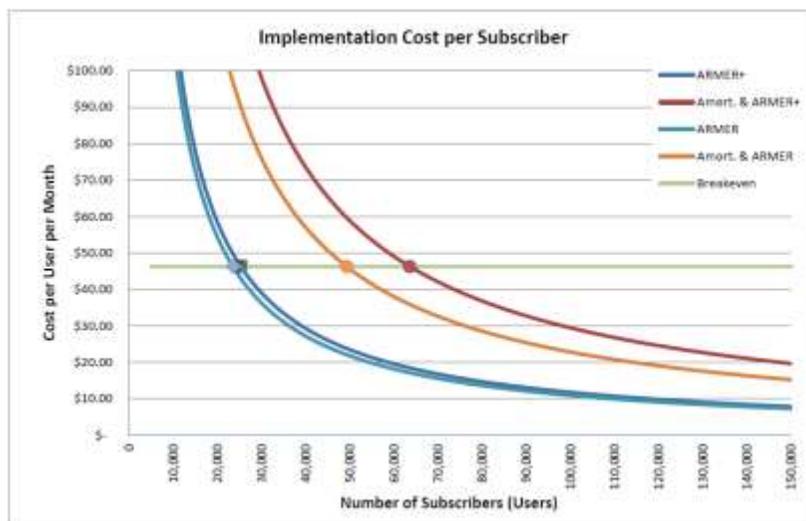


Figure 2: Break-even Point from 2011-2012 Minnesota Public Safety Broadband Study

Technical and Deployment Milestones and Initial Operating Capability

FirstNet should not market service until it has reached a very high level of capability. Public safety agencies have data services through commercial operators that they are very happy with now.¹³ This negatively influences the urgency of implementing public safety service: FirstNet may offer an incremental or substantial improvement, but it won’t offer a novel product without viable alternatives. FirstNet should not damage its brand or credibility by offering a service at Initial Operating Capability inferior to commercial options available to public safety.

Site Hardening

FirstNet should include an availability metric in its SLA with the States. That said, the State considers availability as a potential compromise area to manage costs; generally, when queried to prioritize a single performance metric for this filing, our stakeholders prioritized either coverage (rural areas) or throughput (urban areas). None queried for this filing prioritized availability as the single most important service metric.

Data is not the primary means of communications back to the PSAP for public safety today: the responder’s radio is considered primary for any mission critical communications. It will remain so until there is a better-performing and more reliable substitute. Our stakeholders do not anticipate FirstNet providing a highly-reliable, mission-critical service at Initial Operating Capability; they expect service

¹³ There are certainly coverage gaps, and an inability to achieve priority service is an operations issue during peak network demands on commercial cellular networks, but these networks have set a high watermark for FirstNet.



equal to or incrementally better than their commercial carrier's service provided on public safety - exclusive spectrum.

In the long-term, high availability service provided on hardened infrastructure will be a central requirement to reclassify FirstNet's service as a mission-critical, *primary* means of communication. However, our stakeholders do not believe this is a reasonable requirement for Initial Operating Capability.

We highly recommend that FirstNet consider NPSTC's publication on Public Safety Grade Systems and Facilities,¹⁴ and in particular, its section on hardening.¹⁵ Public safety has expended considerable time in preparing standards and Statements of Requirements (SOR) that individually and collectively provide important insight and standards based options and recommendations for FirstNet considerations. We highly recommend that FirstNet reference these documents and integrate them into the RFP process and eventual operational standards.

Unique Homeland Security Needs

Individual states will have a variety of homeland security needs and unique operational requirements. We feel that identifying these needs, and communicating them to FirstNet, are fundamental components of SLIGP Phases 1 and 2. FirstNet should identify high-value or sensitive targets during the consultation process and provide those areas higher priority in terms of design goals, availability, coverage, throughput, reliability and priority.

It is likely that for any given high-value target, emergency management officials and commercial cellular carriers have implemented response plans already, including network hardening and availability of deployables. We highly recommend that FirstNet consult with these entities when developing plans for ensuring the security of targets with a substantial homeland or national security interest.

Requirements for Opt-out RANs

In general terms, opt-out jurisdictions should be held to the same technical standards as FirstNet and the rest of the nation. If a State opts-out, the State should be held to assume the risk and responsibility of meeting FirstNet's minimum technical standards; opting-out should *not* be a means to a less robust or interoperable public safety network. These minimum technical standards must be published and agreed upon prior to a state's opportunity to make an opt-in or opt-out decision.

Opt-out RANs that Require Changes to the Core Network

FirstNet should not prohibit any potential partnerships that contribute significant value to public safety or to a business case in a particular state and should encourage opt-out states to pursue innovative partnerships as partners in building the NPSBN.

¹⁴ Available at:

http://www.npstc.org/download.jsp?tableId=37&column=217&id=3066&file=Public_Safety_Grade_Report_14052_2.pdf

¹⁵ See *Id.* at pp. 45-92.



However, FirstNet should establish a technical governing body, representing the broad national public safety subscriber community, to evaluate such changes. This technical committee should better represent the direct concerns of the user community than the full FirstNet Executive Board.

FirstNet should hold opt-out state proposers liable for funding any major changes to the national Core network required to implement opt-out RAN. While it is expected that FirstNet will publish standards on which opt-out states would adopt in advancing RAN deployment and integration, in the event that the RAN requires a modification of the national Core, the affected state should be required to fund the required change, and in the event that the RAN cannot be properly integrated, then it should be denied in the best interest of the nationwide network.

As an example, Minnesota has a procedure for evaluating major changes to ARMER infrastructure proposed or required by a member of the user community.¹⁶ The litmus tests for evaluating these major changes include but are not limited to the following:

- A change that requires backbone hardware to be upgraded, reconfigured or replaced
- A change that materially affects a large number of users
- A change that requires end-user device equipment to be reconfigured above and beyond the equipment managed by the proposing party
- A change that requires backbone improvements above the existing operational budget
- A change that incurs cost on other user entities

Such changes are vetted throughout the governance structure, multiple regions and the Statewide Emergency Communications Board's Operations and Technical Committee prior to adoption and implementation. If authorized and once implementation starts, the associated changes are managed by the State just like any other major project including work breakdown, stakeholder engagement, outreach, risk and change control.

Reliability and Restoration

FirstNet could substantially increase the appeal of its offer by providing faster and more effective response to network availability and surge issues. For example, FirstNet could offer rapid provision of deployables to meet coverage requirements during emergency incidents that occur beyond the reliable coverage footprint of the network, and during planned events that stress the normal capacity of the network. These deployable cell-on-wheels (COW) and cell on light trucks (COLT) could be managed locally, or at minimum have local visibility and be available with a high degree of control throughout the state. Status of deployable availability, if they are presently in use and who is using them, along with maintenance schedules and a process to initiate a deployment should be properly managed. In support of such deployments, FirstNet should enter into agreement with broadband satellite providers to ensure guaranteed uplink, particularly when competing with commercial carriers and the news media for access.

¹⁶ See Minnesota ARMER Standard 1.8.0
<https://dps.mn.gov/divisions/ecn/programs/armer/Documents/standard180.pdf>



FirstNet should consider partnerships with *all* major cellular carriers—regardless of whether a particular carrier is FirstNet’s integrator or service provider or not—to add BC14 to deployable sites to ensure the highest and most rapid availability of BC14 deployable sites in all markets.

Presently, agencies in Minnesota have little insight into the status of deployables provided by carriers. Public safety agencies in Minnesota routinely request that a carrier augments their service for major planned events as well as extended incidents, but it can take up to several days for a major carrier to respond and the agency has little to no control or visibility over the resource.

Local agencies should be allowed to provide their own deployables that operate on FirstNet’s network. Several agencies in Minnesota maintain deployable command vehicles equipped with satellite backhaul that provide ARMER and WiFi service. Incorporating BC14 LTE to these vehicles would facilitate an essential incremental upgrade and we encourage FirstNet to enable the availability of the required RAN and broadband satellite uplink capabilities. Such an approach would require a carefully documented process and adherence to technical standards to ensure no harm is done to FirstNet’s network by locally-owned deployables. However, it would provide public safety agencies with the most rapidly accessible FirstNet deployable infrastructure possible and substantially increase the value of FirstNet’s service at minimal cost to FirstNet.

Service Metrics

FirstNet must establish an SLA with each State with defined service metrics to differentiate itself from commercial carriers as well as provide a degree of confidence in FirstNet’s offer.

We strongly recommend a minimum level of guaranteed coverage, per unit of geography, with a guaranteed level of throughput. For example, FirstNet could commit to covering 95% of each county at 4 Mbps on the downlink and 1 Mbps on the uplink for each user within an average distribution of users. In the 2011-2012 Minnesota Public Safety Broadband Data Network Requirements Study, we assessed the feasibility of implementing an LTE network according to the minimum levels of service in Table 1.

The levels of service employed for our 2011-2012 study are not necessarily the minimum levels of service the State anticipates negotiating through the consultation process. For example, we anticipate something closer to symmetrical uplink/downlink rates and significantly higher data throughput speeds, as these figures were agreed-upon several years ago when LTE Release 8 was first available. We also anticipate a requirement for rural trade centers and county seats as distinct from the requirements for the county as a whole. However, we do not anticipate substantially different stakeholder demand from these coverage requirements, as they are based on minimum requirements for ARMER.¹⁷

¹⁷ 95% geographic coverage of each county excluding the Boundary Waters Canoe Area Wilderness



Table 1: 2011-2012 Preliminary Network Requirements, state of Minnesota

Area	UL Required	DL Required	Coverage Level	Geographic Target
Urban Areas ¹⁸				
Minneapolis	256 kbps	1437 kbps	In-building, on-hip	95% within city
St. Paul	256 kbps	1437 kbps	In-building, on-hip	95% within city
Rochester	256 kbps	1437 kbps	In-building, on-hip	95% within city
Duluth	256 kbps	1437 kbps	In-building, on-hip	95% within city
St. Cloud	256 kbps	1437 kbps	In-building, on-hip	95% within city
Metropolitan Areas ¹⁹				
Hennepin County	256 kbps	1437 kbps	Outdoor, on-hip	95% by county
Ramsey County	256 kbps	1437 kbps	Outdoor, on-hip	95% by county
Washington County	256 kbps	1437 kbps	Outdoor, on-hip	95% by county
Anoka County	256 kbps	1437 kbps	Outdoor, on-hip	95% by county
Isanti County	256 kbps	1437 kbps	Outdoor, on-hip	95% by county
Sherburne County	256 kbps	1437 kbps	Outdoor, on-hip	95% by county
Wright County	256 kbps	1437 kbps	Outdoor, on-hip	95% by county
Carver County	256 kbps	1437 kbps	Outdoor, on-hip	95% by county
Scott County	256 kbps	1437 kbps	Outdoor, on-hip	95% by county
Dakota County	256 kbps	1437 kbps	Outdoor, on-hip	95% by county
Greater Minnesota ²⁰				
All other counties	256 kbps	1437 kbps	Outdoor, mobile	95% by county

We recommend that the SLA includes an average per-user availability of a specific percentage. For example, that the user is able to access FirstNet’s WAN and the public internet through a wireless device 99.99% of the time provided that user has adequate coverage.

We recommend that the SLA includes a defined acceptable response window for (1) acknowledging unplanned service-affecting issues, (2) addressing them, and (3) implementing future mitigation strategies. For example, that an unplanned service-affecting issue is responded to within 10 minutes of receipt, is addressed within 4-hours, and a future mitigation strategy is implemented within 20 days.

In its SLA FirstNet should provide some form of remediation for not meeting its service obligation, such as a service credit. FirstNet should provide service reports on a periodic basis and communicate any initiatives to correct ongoing problems or issues.

Technology Enhancement and Upgrades

In general terms, **both FirstNet and opt-out states must maintain the state of the art** and maintain a service offering competitive and in step with commercial carriers.

¹⁸ All Cities of First Class per Minn. Stat. 410.01 as well as St. Cloud, a large central trading area for Central Minnesota.

¹⁹ 7-county metropolitan area per Minn Stat. 437.12 as well as Sherburne, Wright, and Isanti counties

²⁰ All counties not included in a metropolitan area and their except for Cities of First Class and St. Cloud.



Pricing and Deploying Products

Our preliminary research²¹ obtained over the initial course of SLIGP stakeholder requirements gathering shows a great deal of price-sensitivity when offering the FirstNet service at significantly higher cost than commercial services (see Figure 3 and Figure 4). For example, we found that over 60% of agencies in Minnesota surveyed report that cost of current commercial service is *already* a major barrier to adoption of cellular data services;²² any increase above current commercial rates will only exacerbate this problem. Furthermore, about 50% of agencies report that any increase in price compared to current commercial rates will lead them to not subscribe to FirstNet service at all.

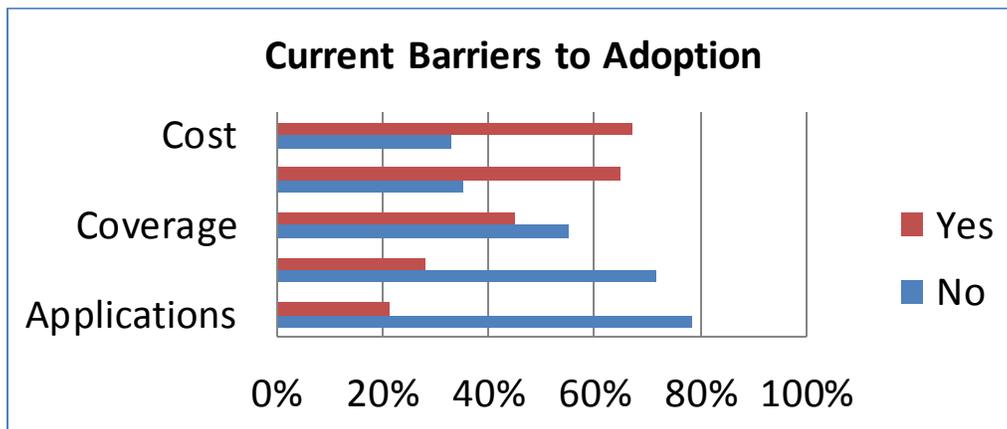


Figure 3: Barriers to Adoption in Minnesota

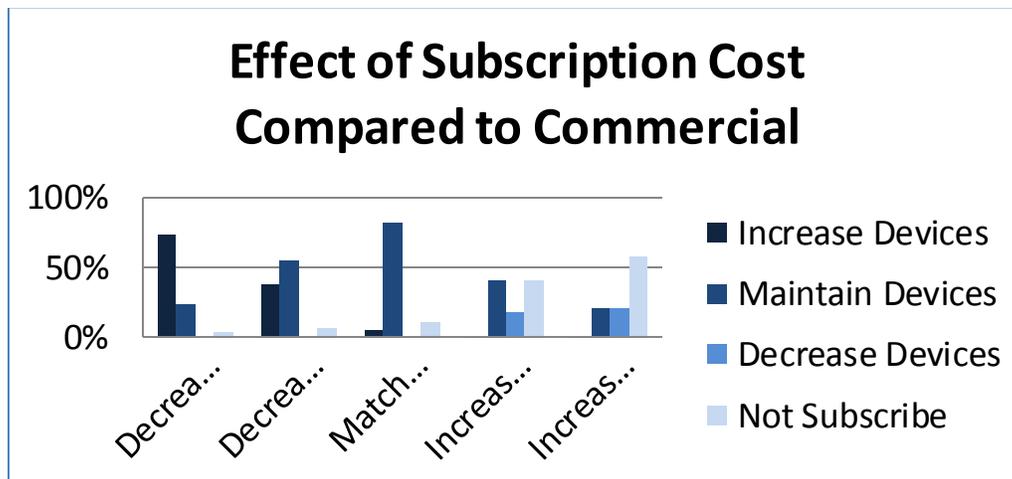


Figure 4: Stated Effect of Cost on Subscribership

Our preliminary research shows FirstNet’s most reliable means to ensure a high subscribership in Minnesota will be to offer service at a cost competitive with commercial carriers.

²¹ See *Minnesota Initial Consultation Meeting Preparation Report*, pp. 54-55. Note that these results are preliminary and only approximately half of jurisdictions in Minnesota have been polled as of this publication.

²² Note that in Figure 3 and in our survey, “cost” means “cost of commercial wireless data services is prohibitive and is a barrier to adoption of cellular data service” and “peripherals” means “cost of laptops and/or vehicle router is prohibitive and is a barrier to adoption of cellular data service”.



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