



Department of Commerce

National Telecommunications and Information
Administration Docket No: 120928505-2505-01

RIN 0660-XC002

Development of the Nationwide Public Safety
Broadband Network

Notice of Inquiry - Aepona Response

October 31, 2012

V1.0

31 October 2012

Kevin Wagner
SVP, Corporate & Business Development
Aepona Inc.
8310 South Valley Highway
3rd Floor
Englewood, CO 8012

National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue NW
HCHB Room 7324
Attn: FirstNet NOI
Washington, DC 20230

Subject: Response on Notice of Inquiry
Docket No: 120928505-2505-01
RIN: 0660-XC002
Development of the Nationwide Interoperable Public Safety Broadband Network

Thank you for the chance to provide comments and information regarding the deployment of the nationwide interoperable public safety broadband network. Attached you will find Aepona's response to key elements of the program. Our comments address the conceptual design network design model and the framework for developing applications for public safety use.

This document is not exhaustive, but is intended to provide input and comments regarding FirstNet based on our experience in similar initiatives across the mobile wireless industry. As it relates to cross-network services, cross-network applications, and distribution of applications and services, Aepona has extensive industry experience relevant to FirstNet's goals and objectives. We hope you find our comments helpful in fulfilling FirstNet's objectives.

Sincerely,

Kevin Wagner

1 FNN Conceptual Network Design Model

The FirstNet Nationwide Network (FNN) conceptual architecture proposes utilizing existing commercial networks to deliver the functionality required by the FirstNet charter. This is a very pragmatic approach that provides a number of benefits, including cost of deployment and time-to-market for the solution. As noted in the presentation, the U.S. mobile operators have invested approximately \$350B over 25 years to build-out and mature their networks to provide coverage and reliable voice and data services throughout much of the U.S. To replicate this investment would be neither cost-effective nor timely.

Over its history, the telecommunications industry has focused extensively on standardizing key technologies and interfaces to enable interoperability of services between networks, including voice, messaging, and data.

Industry initiatives such as the GSMA's OneAPI (<http://oneapi.gsma.com>) have created standard APIs for network services that can be easily accessed by application developers. This is a critical element in providing a complete application-programming model that leverages the capabilities of devices (mobile handsets, tablets, laptops, etc.) and the telecommunications network. Network functionality (messaging, location, voice, QoS, etc.) is a critical element as it supports all devices connected to it, thus providing applications with the maximum reach, and not limited to a specific devices, device OS and/or device manufacturer.

More importantly for FirstNet, the GSMA OneAPI initiative has also proven the cross-operator model for applications utilizing network capabilities. In May 2012, the GSMA announced the commercial launch of the OneAPI Gateway in Canada (<http://www.mobilebusinessbriefing.com/articles/canadian-operators-backing-oneapi/23764>). With this solution, application providers utilize a single web services network API (messaging, location, carrier billing) and their application can reach any device across the three major mobile networks in Canada. This is analogous to the FNN conceptual architecture, which proposes a common services layer for FNN that connects into multiple existing telecommunications networks.

The benefit of this architecture is two-fold: (1) it provides an abstraction layer for applications and services, creating a common set of interfaces independent of the underlying networks and specific network vendors, and (2) it enables FNN to evolve and incorporate additional networks and functionality without adversely impacting existing applications and services. The latter is important as FirstNet expands its operator partnerships and services over time.

Another advantage of the FNN conceptual architecture is it utilizes the wholesale business units that exist within many of the mobile network providers. The wholesale business units are charged with providing network and services to 3rd parties that operate a business under a brand other than the mobile network provider's. Examples of this include the Mobile Virtual Network Operators (MVNO) such as Boost Mobile, Net10,

Walmart Family, and others. By leveraging an existing business model within the service providers, FirstNet can accelerate the time-to-market with the conceptual architecture.

With all the positive aspects of the FNN conceptual architecture, there are challenges with this model that will need to be addressed. Among these are the availability of interoperable push-to-talk (PTT) services; QoS / priority services, and application request routing. For public safety-centric services such as PTT, mobile network providers have deployed a mix of solutions with a wide variety of success and take-up. For these types of services, the best route for FirstNet will be to deploy those services / servers directly in the FirstNet network as contemplated in the conceptual architecture. This will provide FirstNet the most control over critical services specific to public safety and the ability to make sure the appropriate APIs are exposed to application providers in a cross-network environment.

QoS and priority services will require an additional level of sophistication and cooperation with commercial service providers. Some network vendors have these capabilities built into their products that are deployed today. Making those capabilities available to the FNN services layer will be key to ensuring the appropriate behavior required by FirstNet. This will enable FNN services and applications to leverage those network capabilities.

Lastly, the fundamental capability required will be the appropriate routing of applications and services to devices in a cross-network environment. While the telecommunications industry has addressed that requirement for core services such as voice and messaging, there is an added element required for applications utilizing the network. This issue has been addressed in the GSMA OneAPI commercial deployment and is a capability that FirstNet should look to include in the service delivery platform shown in the FNN conceptual architecture.

From an overall perspective, we are very supportive of the FNN conceptual architecture and believe it is the right approach to take for the reasons that have been stated. Additionally, we believe it is critical that FirstNet build a cross-network service delivery capability to provide a consistent set of APIs, functionality, policy, and security in this cross-network solution. The commercial deployment of the GSMA OneAPI gateway offers valuable insight and lessons in how this can be successfully accomplished.

2 Framework for Developing Applications

In addition to the FNN conceptual architecture, the notice of inquiry request comments on a potential framework for developing applications and key elements within that framework. This paper does not cover all the elements described in the notice of inquiry, but does capture key pieces we feel we can provide important insights based on our experience in working closely with service providers and application developers.

2.1 Applications that would benefit public safety users

While the public safety market is not an area we have traditionally operated in, we do see a number of similarities with enterprise field force management, an area we do have experience. With field force management applications, the objective is to make the workforce in the field more productive. Productivity can be measured in various ways depending on the enterprise utilizing the applications. But, fundamentally it means maximizing the utilization of the resources available (people, apparatus, equipment, time, etc.).

These applications utilize capabilities on the devices, the network, and 3rd parties to provide the information workers in the field, workers in a call center, and managers of the business to facilitate the goals of the business. It appears those similar applications, repurposed for the specific needs of public safety users, could be equally or more valuable in optimizing response times, communications between first responders, and resulting safety for the citizens. This is an area we recommend further investigation to determine how existing applications, and thus the existing application ecosystem, could be leveraged to facilitate quality applications for public safety users.

The applications that benefit public safety can be built around additional capabilities provided through the FNN conceptual architecture services layer and addressing the specific needs of public safety users, particularly in multi-agency, multi-jurisdictional incidents. Some examples are:

- Integration with mapping, GIS and location information.
- Assignment of dedicated communications channels, ex: dispatch vs. tactical communications for incidents, utilizing network QoS and prioritization, particularly as network demands varies with the scale of the incident.
- Device-based video back to command centers
- Securing tactical channels, particularly for law enforcement

2.2 Interface requirements and other information innovators need to develop applications

The telecommunications industry has invested heavily in creating standard interfaces for different components and functions to facilitate interoperability. FirstNet should look to utilize those where possible in order to capitalize on the investment the industry has already made. For FirstNet, this means easier connections and interoperability with existing network providers, economies of scale from suppliers, and multiple vendors available for solutions supporting open standards.

For application providers, it will be important the FirstNet service delivery platform support existing, industry standard network APIs. The GSMA OneAPI initiative has created a set of standards for network APIs that have been widely adopted by network providers and vendors. Additionally, the GSMA is continuing to develop APIs for additional network functionality, providing on-going evolution and innovation based on requirements from application providers, service providers and vendors. The result is a proven set of API specifications for application providers that is well understood and widely supported in the industry.

It is worth noting that FirstNet does not need to limit its network API capability to what is currently available in the industry. By following well-accepted principles for web service API design, FirstNet can provide public safety specific interfaces for applications that will integrate easily with the existing ecosystem of developer tools and application developers.

In addition to the APIs themselves, developers require easy to use documentation, code snippets, easy to access information repository (forums, wikis, blogs), facilities for testing, debugging, and certification. These are some of the capabilities application developers have come to expect in a service provider's developer portal and are a critical element to ensuring innovation and quality applications can be developed.

Through a combination of accepted industry standards, providing public safety specific APIs developed with well-accepted design principles, and providing easy to use developer portal and sandbox, FirstNet can tap into the existing ecosystem of application developers to provide quality public safety applications.

2.3 Security Requirements for Public Safety

Public safety users will require a number of security elements. Key among those will be authentication and encryption.

2.4 Framework and organizational factors allow for the greatest number of quality applications

In our experience, there are several key factors that allow for the greatest number of quality applications:

- Discovery and Distribution – the ease at which applications can be found and made

available to end-users.

- Application Monetization – the model by which applications drive revenue for application providers and how the application provider is paid.
- Platform Capabilities – capabilities of the service that provide the basis of innovation by the application developers.
- Simplicity – the ease of application providers doing business with the service provider.

These elements must work in cooperation to encourage investment from application developers to realize the maximum number of quality applications. Without one or more of elements, application developers will choose to invest their efforts with initiatives that do have these elements. As result, these factors should drive the framework and organizational principles, and aligned with the FirstNet charter.

The first two elements (Discovery and Distribution, Application Monetization) will be addressed in a subsequent section.

In terms of platform capabilities, we believe FirstNet is well positioned to deliver a compelling platform to application developers. This platform should include both handset and network functionality for application providers, as the handset and network provide different, but complementary functionality for applications. In general, handsets perform well for rendering applications and accessing capabilities that are local to the device (ex: device GPS, battery, etc.). Applications on a device are generally developed for a specific device and OS. This creates fragmentation issues in a heterogeneous environment, where handset application are required to support many combinations of manufacturers and OS versions.

Server-based applications, which are able to access network capabilities, provide a different set of tools and features that are able to work across any device that is connected to the network. These capabilities are particularly useful when communicating across groups (messaging, voice), locating another device or set of devices, and doing so independent of the device manufacturer and OS version.

Through a combination of device and network capabilities, FirstNet is able to provide a rich set of platform features for application providers.

Simplicity is a key element that application developers look for when deciding where to make their investments. Simplicity has a technical component as a well as a business component. The technical component can be addressed through some of the items mentioned previously – standards-based APIs, rich documentation, code snippets, testing facilities, etc.

The business component has to do with the business processes FirstNet will require application providers to engage for contracting, commercial terms, certification, application distribution and payment. Some of these elements can be simplified by aligning FirstNet processes to commonly accepted principles that have been established through successful application developer programs. This may include items such as standardized contracts and policies that application providers can agree to electronically and revenue share models that are reflective of leading application developer programs.

2.5 Specific suggestions for FirstNet’s application certification requirements

It is common for application certification programs to have a multi-step process that starts with initial developer testing to full commercial application certification. At a high-level, this can be divided into 3 steps.

- “Sandbox” testing – provides developers the ability to test server-side applications against FirstNet network APIs. In this stage, the developer does not have access to a live network and is testing their application against a lab-based system that simulates the network behavior. Support is typically handled electronically through a developer portal. This stage enables developers to debug their application (behavior, authentication, error handling, security, etc) and “self-certify” the application against the FirstNet process and apply for the next stage of testing & certification.
- “Limited Live” testing – in this stage, the developer is granted access to a live network for a limited amount of traffic to ensure the application performs as expected in a live network environment. This stage will require the application provider to agree to a contract with a service level agreement (SLA) regarding use of the network. This policy can then be enforced in FirstNet service delivery platform.
- “Commercial Certification” – in this stage, the application is certified by FirstNet against a set of requirements specific to the needs of FirstNet users. This stage will also include contracting / commercial terms if the application is to be distributed through a FirstNet distribution channel. At the conclusion of this stage, FirstNet will certify an application for use on the FirstNet network.

The certification process for handset applications should follow a similar framework. To simplify the certification process, it is recommended that FirstNet limit the number of device OS platforms for applications. An increasing number of device OS options create fragmentation for handset-based applications, increasing the cost of development, maintenance, and support. Additionally, FirstNet should establish a program through which application providers can access FirstNet devices for a reasonable fee. This will help simplify the application certification process by making it possible for application developers to develop and test with FirstNet certified devices.

2.6 Possible delivery models

The delivery and distribution model for applications, particularly mobile application, has evolved significantly over the past 5 years. The commonly accepted distribution model is via electronic application stores due to the ease of discover and delivery for end-users and the monetization and distribution channel for application providers.

However, the application store is simply one element of a more complete application distribution model. At the highest level, application delivery should embrace multiple channels to the market – electronic delivery via application store, direct sales by

application providers, and system integrators. These channels can be further refined for the specific needs of the public safety users (fire, police, paramedics, etc.).

For FirstNet, the application store should be expanded to provide a more complete service aggregation and merchandizing capability. What this capability provides is FirstNet the ability to “package” applications, services, and devices for specific public safety market segments. As an example, a “Municipal Fire” package consisting of FirstNet certified applications and devices could be assembled by FirstNet, offered through an electronic storefront, and purchased by municipal fire users.

The service aggregation and merchandizing capability enables FirstNet, or other channels, to configure offerings to specific markets – including applications and devices – as a way of making it easy for public safety users to access the applications and devices on FirstNet. This capability extends the application store approach by providing a more complete electronic storefront for FirstNet certified products through multiple channels serving public safety.