FirstNet
Notice of Inquiry

November 1, 2012

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1. Introduction and Network Recommendations

Spacenet applauds the First Responder Network Authority (FirstNet) and the NTIA on the work being done to define and implement a Nationwide Interoperable Public Safety Broadband Network. While understanding that the primary focus of the FirstNet work plan is to architect a terrestrial wireless network, Spacenet would like to call to the attention of FirstNet several critical details related to the proposed design that are relevant to the satellite data communications industry. Our brief comments in response to the NOI are included below and are based on real world experience in support of first responder networks. Spacenet would welcome the opportunity to further discuss with FirstNet any of these specifics at your convenience.

Who is Spacenet?

As one of the nation's leading satellite service providers, Spacenet has a long and rich history in supporting the communications needs of the first responder community. Spacenet's customers include both the New York Police Department and the Los Angeles Police Department, as well as many other local and state public safety entities.

Spacenet's product offerings to the public safety community include:

- Integrated satellite, Wi-Fi, and LMR packages through our ION series of products
- Communications-on-the-Move (COTM) and Communications-on-the-Pause (COTP) self-pointing satellite antenna systems
- Continuity of Operations (COOP) connectivity options including options for on demand, dedicated high bandwidth solutions through our Emergency Communications Services (ECS) product line
- Point-to-Point mesh based communications through our SkyEdge II product line for voice and data backhaul disaster recovery

Redundant Backhaul Capability

In reviewing the proposed architecture for a nationwide wireless network, Spacenet would like to highlight the critical nature of the backhaul facilities between individual wireless towers and the core network. In many cases, and especially in times of emergency, the towers remain up but become isolated from the rest of the network due to failures in the terrestrial backhauls rendering the network unusable. These failures can be due to impacts of weather (as experienced in many of the hurricane and winter storms that are experienced each year), or do to overloading on the network caused when a disaster redirects much of the terrestrial traffic onto wireless networks.

Satellite backup connectivity for these backhaul connections provides a significant increase in overall system reliability, and can be done in a highly cost-effective manner. Spacenet, and its parent company Gilat, have extensive experience implementing these types of solutions and have developed systems and equipment specifically tailored to meet these needs. These systems build on technologies used for cellular backhaul in parts of the world where terrestrial connectivity is not an option. However, these highly optimized solutions fit equally well into a backup scenario to be used with the proposed FirstNet design. Spacenet offers the industry leading SkyEdge II Accent satellite modem, which is designed specifically for such backhauling requirements. The Accent modem can dynamically switch between TDMA and SCPC modems to optimize bandwidth efficiency according to traffic demands while minimizing ongoing costs.

Development of a nationwide backhaul redundancy network would require local site equipment at each wireless tower, but could take advantage of the fact that only a relatively small number of towers would need this backup to be active at any given time. This would allow for low ongoing operating costs because the network would not require the satellite space segment provisioned to serve the entire network, but rather just a fraction of it.

Adding the redundant backhaul capability to any nodes that will be used for first responder communications should be considered as a requirement for the FirstNet solution. Otherwise, this highly advanced network will run a significant risk of being significantly compromised in times of widespread disasters which affect backhaul availability.

Interoperability

Spacenet also strongly recommends that FirstNet consider how satellite based services can be integrated into the interoperable network. No matter how thorough the coverage of the new network, there will always be cases where terrestrial wireless coverage is not available. Indeed, Spacenet equipment has been deployed multiple times within the Los Angeles Police Departments service area because terrestrial connectivity was not available, even in this metropolitan area.

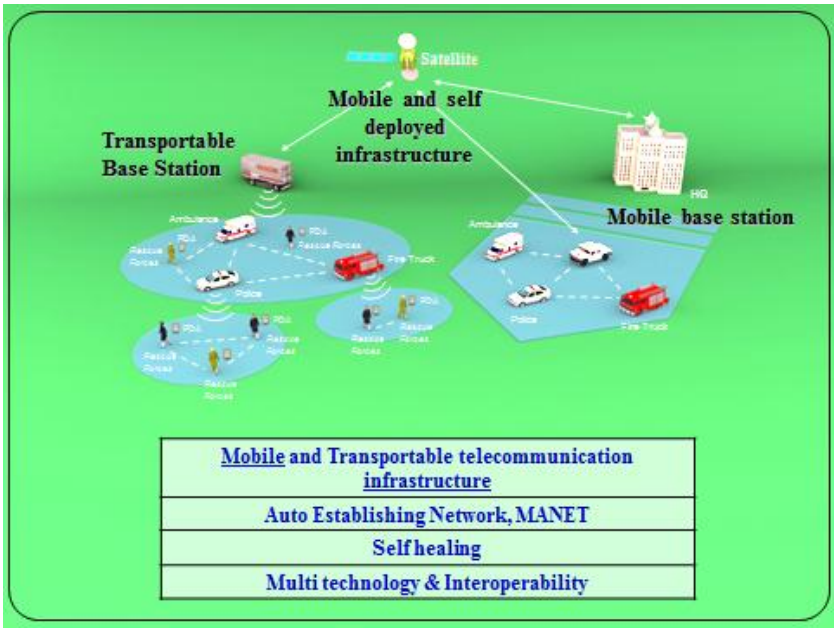
Additionally, even in areas that traditionally have wireless coverage, natural disasters such as hurricanes or tornados may destroy existing infrastructure. Mobile command posts equipped with satellite communications can be quickly deployed to cover such holes – and in most cases much more quickly than Cell-on-Wheels (COW) solutions provided by wireless carriers. Spacenet has worked with traditional LMR providers such as Motorola to develop multiple mobile command vehicles deployed in both metropolitan and rural operational areas. These vehicles are regularly called on to provide communications for first responders.

Interoperability between the greater terrestrial network that FirstNet is designing and supplementary satellite based components will be required in order to provide the ubiquitous coverage needed by first responders. As such, solutions utilizing this already tested and deployed technology should be considered part and parcel to the overall architecture.

Advanced Capabilities

Spacenet's parent company, Gilat Satellite Networks, is currently involved in several research and development areas of specific interest to a first responder network. In addition to advancing the capabilities described above to support LTE, LTE Advanced and WiMAX backhauls, Gilat is actively working to develop capabilities for Mobile Ad Hoc Networks (MANET). This architecture allows satellite connected mobile base stations to further supplement the coverage offered by fixed terrestrial networks, thereby greatly expanding the reach and flexibility of a FirstNet nationwide network. A graphical representation of this concept is provided below. Further information can be found at www.rescue.org.il.

FirstNet, by considering these developing SatCom technologies now while network architectures and standards are still being developed, will significantly increase the likelihood that full interoperability can be achieved "out of the box", shorting development time, decreasing costs and increasing functionality.



2. Spacenet Case Studies

Listed below are a number of case studies which highlight how satellite communications have already been used to augment standard Land Mobile Radio and IP data communications networks in use today. These case studies discuss both ways that satellite communications can be used to temporarily expand the footprint of existing networks when needs arise, and to offer backup services when established terrestrial networks fail. We believe that in their charter to provide a nationwide network; FirstNet should consider the value that satellite communications can add in both these and other areas in order to provide seamless communications to the nation's critical first responder community.

2.1 Case Study: Public Safety Independent, Redundant & Diverse Network

For a major public safety agency, a satellite network provided an independent, redundant and diverse network to provide continuity of operations and ensure its communications stay running, no matter what.

Snapshot:
A major public safety agency needed a continuity of operations network solution to support secure voice and data. Spacenet provided a custom "hot stand-by" satellite solution integrated with the customer's primary wireline network. The customer benefited from having a solution that provides complete voice and data that is integrated into its existing IT infrastructure, as well as a network backup solution to enable near 100% network availability.

- **Requirements:** A major public safety agency needed a continuity of operations network solution. It needed a network that could support secure voice and data applications, and that could be integrated into its existing IT infrastructure. It also needed a solution that could withstand varying weather conditions, including high winds.
- **Solution:** Spacenet provided an always-on "hot stand-by" satellite solution integrated with the customer's primary wireline network. The solution was a custom satellite network, employing the Cisco VSAT Network Module for seamless failover in the case of a primary network outage. In addition, the solution included custom antennas that could withstand high winds of 200mph.
- **Customer Value:** Spacenet's SkyEdge VSAT solution provided complete voice and data, integrated into the customer's existing IT infrastructure, which consisted of a terrestrial network. In addition, the solution provided a network backup solution and near 100% network availability.

Customer Value

- Total network back-up solution
- Independent from terrestrial network
- Near 100% network availability

2.2 Case Study: Missouri Department of Transportation Satellite Services for Public Safety and Emergency Response

For the Missouri Department of Transportation (MoDOT), a satellite network provides a comprehensive and reliable backup and emergency communications system to ensure critical communications always stays online, and enables coordination with other agencies and support personnel.

Snapshot:
Spacenet's advanced satellite services were deployed as part of an emergency response network for the Missouri Department of Transportation (MoDOT). MoDOT is utilizing both fixed and transportable systems, and Spacenet's flexible backup satellite service that can be instantly deployed, providing a more cost-effective solution for units that can remain in standby for extended times. The innovative solution supports full Voice over IP (VoIP) and Radio over IP (RoIP) capabilities with Quality of Service (QoS), Internet access, and can interface with trunked radio systems and analog systems. The solution enables seamless transmission capabilities and control to communicate and interconnect remote tower sites by satellite, and interoperability with legacy radio systems. The emergency network can be operated and controlled from virtually any location that has access to a high-speed Internet connection, enabling communications over radio across the world.

- **Requirement:** MoDOT was seeking to expand its emergency communications network in order to fulfill its mission and ensure public safety in any situation. MoDOT has experienced first-hand the importance of a reliable emergency communications network. In 2008 alone, Missouri dealt with disastrous situations including major flooding and ice storms that were declared state emergency situations. By providing emergency communications services during situations like these, MoDOT helps saves lives.
- **Solution:** After originally testing other leading satellite networks, MoDOT realized that many of the solutions were too costly, or just didn't work properly, and none of them supported all of their requirements. After careful research for leading vendors, MoDOT teamed with Spacenet, a leading provider of satellite networking services, to design and implement an innovative

satellite solution. The innovative solution supports full Voice over IP (VoIP) and Radio over IP (RoIP) capabilities with Quality of Service (QoS), Internet access, and can interface with trunked radio systems and analog systems. The solution enables seamless transmission capabilities and control to communicate and interconnect remote tower sites by satellite, and interoperability with legacy systems. The emergency network can be operated and controlled from virtually any location that has access to a high-speed Internet connection, enabling communications over radio across the world.

Customer Value

- Easy to deploy
- Scaleable transportable solution
- Interoperability

- **Customer Value:** Since the implementation, MoDOT's emergency communications network has been put to use numerous times for real-time deployments, and consistently allowed Missouri emergency response units to communicate better and ultimately perform at peak efficiency. The system has been used to support numerous government agencies including police and fire departments, city governments and the military. The network has proved to be invaluable during emergency situations, and during widespread wireline outages, MoDOT's radio and telephone communications were uninterrupted.

2.3 Case Study: American Red Cross Disaster Recovery – Haiti Earthquake Relief Efforts

On January 12, 2010 a series of earthquakes with magnitudes ranging from 6.5 to 7.3 struck Haiti. The International Red Cross estimated that about three million people were affected by the quake. Major structures were destroyed, along with countless homes and businesses. In addition, the communications infrastructure in Haiti had been completely demolished. The American Red Cross began working with its partners in the global Red Cross and Red Crescent network, including the Haitian Red Cross, and other partners to assist those affected by this disaster in what would become the largest international mobilization of resources in the Red Cross's history.

Customer Value

- "Plug and Play" Operation
- Quick installation and moveable within a day
- Support for broadband

Snapshot:

A major public safety agency needed a continuity of operations network solution to support secure voice and data. Spacenet provided a custom "hot stand-by" satellite solution integrated with the customer's primary wireline network. The customer benefited from having a solution that provides complete voice and data that is integrated into its existing IT infrastructure, as well as a network backup solution to enable near 100% network availability.

- **Requirements:** The Red Cross needed a communications network for disaster relief efforts in the wake of the devastating earthquake in Haiti including support for high-speed data and voice.
- **Solution**: With a particular expertise providing broadband communications where other companies cannot, Spacenet was committed to doing its part to assist with earthquake relief efforts. Along with one of its partners, Echostar Satellite Services, Spacenet donated

equipment and services to the relief efforts. Spacenet dish antennas, two-way ground stations and satellite services supported four relief sites with wireless Internet access, which allowed the 250 International Red Cross teams in Haiti to communicate their medical and personnel needs and requisition supplies.

- **Customer Value:** Because VSAT broadband satellite technology can be deployed anywhere and does not depend on local communications infrastructure, it has played a large part in the re-establishment of data and voice communications networks in the aftermath of many emergency situations. VSAT-based systems provide an ideal service for a "base camp" of multiple first-responder personnel requiring a number of Internet connected PCs and PSTN-connected telephones.

To support the immediate communications needs in Haiti, Spacenet's services could be installed quickly in any fixed location (including parked vehicles or docked ships) completely independent of the local Haitian infrastructure. Rapid deployment communications via satellite enables in-field personnel to be online and connected to the Internet, voice lines, and secure networks in a matter of minutes. These solutions are ideal for remote operations and emergency response services, mobile telemedicine, and other applications requiring frequent set-up and tear down.

2.4 Case Study: Louisiana Department of Public Safety Satellite Services for Public Safety and Emergency Response

For the Louisiana Department of Public Safety (LDPS), a satellite network was used to support critical communications during and after back-to-back hurricanes Gustav and Ike. Its emergency response satellite network helped bring vital communications online during severe weather conditions.

Snapshot:
Spacenet's services were used to support an emergency communications network for the State of Louisiana as part of a hybrid network, providing critical communications during and after back-to-back hurricanes Gustav and Ike. Spacenet's Connexstar satellite services provided support for the state's VPN connections and Voice over IP emergency telephones. The network connected the Department of Public Safety in Baton Rouge to Highway Patrol Trooper Headquarters located at sites across the affected zones. The satellite systems proved to be extremely reliable, enduring winds in excess of 100 miles per hour for sustained periods of time.

- **Requirement:** LDPS was seeking to expand its emergency communications network and needed a rapidly deployable solution that could support critical communications during disastrous situations, including severe weather conditions.
- **Solution:** LDPS deployed an emergency satellite communications network using Spacenet's satellite services to support critical operations during and after back-to-back hurricanes Gustav and Ike. The satellite network provided support for the State's VPN connections and Voice over IP emergency telephones, and connected the Department of Public Safety in Baton Rouge to Highway Patrol Trooper Headquarters located at sites across the affected zones.
- **Customer Value:** The satellite system proved to be extremely reliable, enduring winds in excess of 100 miles per hour for sustained periods of time. Overall, the solution provided backup to Land Mobile Radio connectivity to state tower sites; backup data and Internet connectivity; both mobile and fixed satellite systems; and VoIP telephony.

Customer Value

- Withstands winds over 100 mph
- Fixed and transportable systems
- Rapid Deployment

3. Spacenet History and Capabilities

Spacenet provides stand-alone and hybrid telecommunications solutions tailored to meet the unique mission-critical requirements of military, homeland security, emergency response and disaster recovery, humanitarian and other Government organizations. Spacenet leverages a strong history and culture of technical excellence, R&D and system integration capabilities to deliver reliable, vendor-agnostic, standards-based, interoperable and flexible solutions to meet the needs of our clients.

Since 1981, Spacenet Inc. has designed, implemented and managed some of the largest communications networks for U.S.-based business, industrial and government customers. Spacenet has a longstanding tradition of industry leadership and innovation, and today manages communications at more than 130,000 locations for customers including many Fortune 500 companies and major government agencies. The company offers a complete product and services portfolio for converged voice and data applications ranging from primary communications and secure data transfer, to hot stand-by solutions for continuity of operations and network backup, or field deployable solutions for disaster recovery and emergency management. Spacenet is based in McLean, VA, and operates its own end-to-end services infrastructure including network management, field services and teleport facilities in McLean, VA, Atlanta, GA, and Chicago, IL. Spacenet is a wholly owned subsidiary of Gilat Satellite Networks Ltd. (Nasdaq: GILT). Visit Spacenet at www.spacenet.com.

In addition, Spacenet provides satellite communications networks serving customers in the Oil and Gas, Gaming and Law Enforcement market sectors, Spacenet has developed and refined its service to provide very high availability networks. This high availability offering is predicated on multiple tenants, including geographically diverse, secure and privately owned teleports with redundant equipment to support fast switching of services between facilities, strictly followed operating processes and frequent exercise of hub diversity failovers.

Spacenet provides IP-based digital satellite communication networking products and services, fixed and transportable VSATs, portable manpack terminals, satellite modems, satellite antennas, and networking appliances. Spacenet also offers managed network services in North America and other parts of the world using a network of secure and reliable teleports, and offers both pre-packaged subscription services and custom offerings, such as dedicated bandwidth. The company's professional services include the seamless integration of voice, video, encryption and acceleration services, as well as the complex design of terrestrial and satellite networks, applications and bandwidth optimization.

Spacenet provides end-to-end solutions utilizing satellite and terrestrial services; offers continent wide coverage (North America); provides carrier-class facilities with a 24x7 customer-care center, and offers large scale capabilities with over 130,000 VSAT sites deployed. Other capabilities include:

- **100% North American Coverage:** Integrated satellite, terrestrial, and wireless
- **Primary, Stand-by & Mobile Solutions:** Multiple form factors for a variety of applications
- **Single Network for Voice, Video & Data:** Secure networks for mission critical environments
- **Hybrid Networks for Maximum Availability:** Cost effective "on demand" service plans
- **Rapid Deployment for Emergency Response:** Vehicle mounted and transportable solutions
- **One-Stop-Shop for Total Managed Solution:** Turn-key design, implementation, and maintenance

Spacenet also specializes in the development and provision of low-profile, in-motion, 2-way satellite antenna systems and emergency communications systems. The company's RaySat™ line of StealthRay™ low-profile satellite antenna systems provide government agencies with reliable

SATCOM-On-The-Move (SOTM) capabilities to enable secure transfer of real-time Beyond-Line-of-Sight information exchange between field and command locations.

3.1 RaySat Antenna Systems

RaySat Antenna Systems (RAS) is located in McLean, VA with 120 employees worldwide. RAS specializes in the Research and Development (R&D), marketing, sales, implementation, and program support for low-profile, two-way SOTM land mobile and airborne systems. Our expertise encompasses the entire development process, from concept to production.

RAS antennas are specifically designed to meet the unique mission-critical requirements of the US Department of Defense (DoD), international military agencies, mobile emergency communications, homeland security, intelligence community, governmental/civil organizations, private security, asset tracking and general mobile satellite data communications. RAS is the current global low profile SOTM market leader with an estimated 70% share of the low profile antenna global market. RAS has delivered approximately 2000 two-way & 10,000 receive-only SOTM antennas to the US and international markets.

RAS has deployed various antenna types in the theater of operation with the 10th Mountain Division and 4th Infantry Division and is currently deployed with the 1st Cavalry Division in Kuwait and 2nd Infantry Division in Korea. Our antennas have been installed on a variety of military vehicles including HMMWV, MRAP and Stryker. The antennas were also successfully tested by other DoD organizations such as 82nd ABN, CERDEC, ATEC, Battle Labs, and 18th Airborne Corps. Figure below depicts RAS terminals on several land vehicles and an unmanned aircraft system (UAS).

Through Wavestream, Spacenet can also provide a family of Ku-band Block Upconverters (BUC) that provides customers and systems integrators with field-proven, high performance, high reliability; high efficiency solutions designed for broadcast satellite communication systems worldwide.

3.2 Wavestream

Wavestream is the largest, independent designer and manufacturer of high-power Solid State Power Amplifiers (SSPAs) and Block Upconverters (BUCs) for mission-critical satellite communications for land, maritime and air environments worldwide.

Wavestream's patented, leading-edge Spatial Power Combining technology enables higher output powers from smaller packages with greater efficiency, reliability and lower cost than any other technology. Wavestream sets the standard in the design and manufacture of next generation high power solid state amplifiers.

Wavestream has shipped more than ten thousand BUCs, many of which have been in continuous operation for years in extremely rugged conditions.

The Wavestream BUC stands apart from traditional amplifier solutions due to its innovative Spatial Power Advantage™ technology. This unique, patented technology allows the BUC to generate higher output power in lighter, more compact product package that use less energy and are more reliable.

Wavestream's powerful solutions are designed to replace aging, less efficient amplifiers, helping systems integrators get the performance they need while reducing energy and maintenance costs over the lifecycle of the system.

Wavestream products are biased for Class AB operation, drawing less power when backed off to help save valuable energy resources. They generate less heat, ensuring a higher MTBF (Mean Time Between Failures) for greater reliability and lower lifecycle costs.

Below are some key features of the Wavestream Matchbox BUC:

- Small, Lightweight Package
- Low Power Draw, High MTBF
- Flexible, Modular Feed-Mount Design
- Holds Specs Over Temperature and Frequency
- Automatic Switching 1:1 Redundancy Systems are available

4. Conclusion & Next Steps

Spacenet appreciates this opportunity to provide our preliminary recommendations and insight to FirstNet regarding the design and implementation of a Nationwide Interoperable Public Safety Broadband Network. We are confident that our 30+ years' experience with first responder networks will be of great value to FirstNet and we welcome the opportunity to further discuss this important initiative with you. For further information on Spacenet, please visit us on the web at www.spacenet.com. For additional inquiries regarding this project, please contact Mr. Mike Mazza, Vice President Government & Industrial Services @ 703-848-1325 or via email at mike.mazza@spacenet.com.