# SAFECOM Guidance For Public Safety Entities Interested In Purchasing Broadband Equipment

BACKGROUND

For many years, public safety agencies have relied on traditional land mobile radio (LMR) systems to communicate during day-to-day response, large-scale emergencies, and natural and man-made disasters. LMR systems are "the primary means of voice communications among public safety personnel. These systems typically consist of handheld portable radios, mobile radios, base stations, and repeaters. Figure 1 below illustrates the basic components of a land mobile radio system."[1]

- **Handheld portable radios** are typically carried by public safety personnel and tend to have a limited transmission range

- **Mobile radios** are often located in vehicles and use the vehicle's power supply and a larger antenna, providing a greater transmission range than handheld portable radios

- **Base station radios** are located in fixed positions, such as public service access points or dispatch centers, and tend to have the most powerful transmitters.

- **A network** is required to connect the different base stations to the same communications system.

- **Repeaters** are used to increase the effective communications range of handheld portable radios, mobile radios, and base station radios by retransmitting received radio signals. Figure 1 below illustrates the basic components of a land mobile radio system.[2]

**Figure 1.** Basic Components of a Land Mobile Radio System
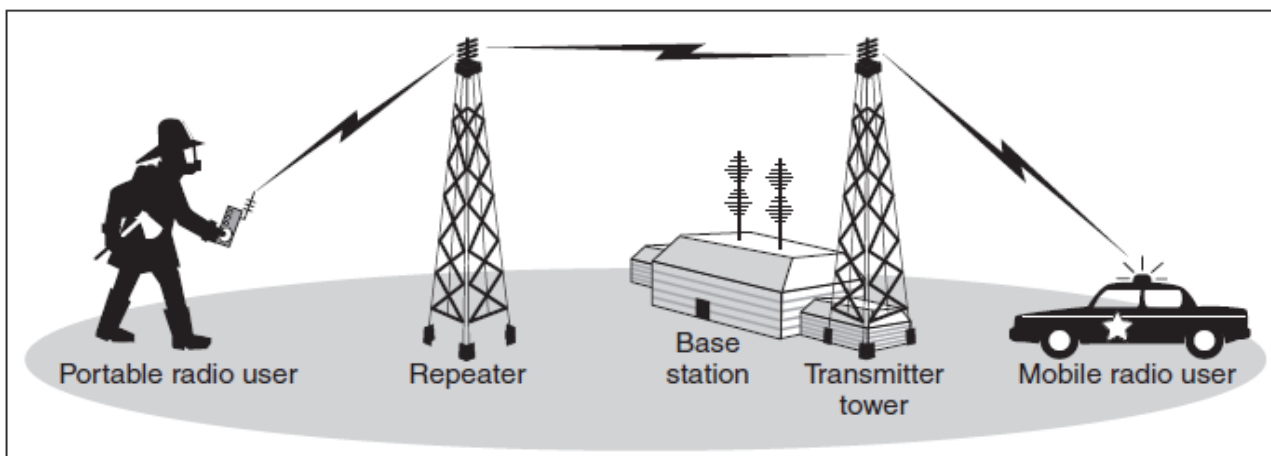
Source: GAO-07-301

Radio systems are classified as either **conventional** or **trunked**. Conventional radio systems have dedicated frequencies—also referred to as channels—assigned to individual groups of users. When a user makes a call, and selects a channel, other members of the group cannot use the channel until the call is over.[3] In contrast, trunked systems are computer-controlled, and assign a pool of channels for use by multiple individuals. When a call is made by a user on a trunked system, an available channel is automatically selected by the system from the pool of channels, leaving the remaining channels available for others. While trunked systems are more complex and require more infrastructure than conventional systems, they allow for the sharing of channels among a large group of users, increase capacity and interoperability, reduce congestion, and enable the more efficient use of communication channels.[4]

Over time, many public safety agencies have migrated towards more advanced communications systems – first, from conventional to trunked systems, and now toward Internet Protocol (IP)-based systems. IP-based networks are computer-based networks that allow states to connect radio sites across the state or across the region. Figure 2 provides an example of a regional or statewide IP network.

Figure 2. Example of a Regional or Statewide IP Network
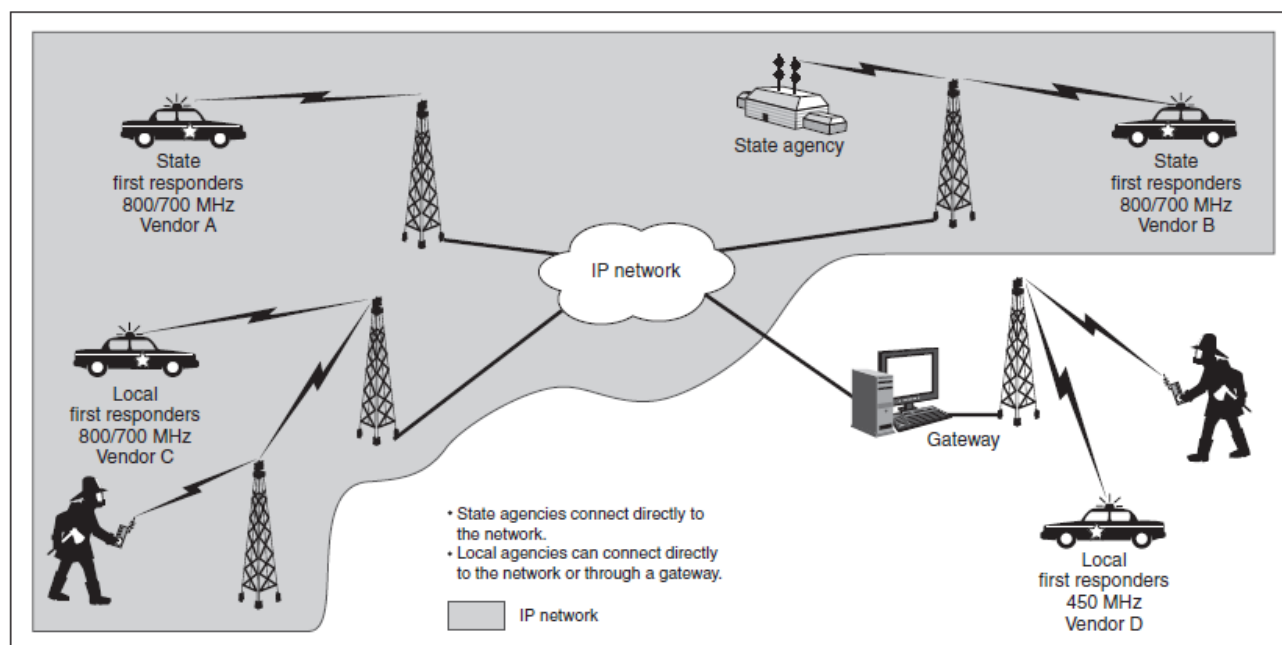
Source: GAO-07-301 to

These statewide networks or regional networks provide a means for multiple agencies, disciplines, and responders to communicate during day-to-day operations, as well as during large-scale disasters. These systems have allowed agencies to increase capacity (i.e., the number of users on a system), enhance capabilities, and improve interoperability.

Public safety agencies are also leveraging broadband networks to improve communications. Public safety agencies are leveraging commercial wireless broadband services,[5] and some have developed and deployed their own local or municipal broadband networks[6] for mission critical data communications. The use of broadband networks will transform how public safety stakeholders communicate. Such networks will provide unparalleled connectivity and bandwidth,[7] allowing agencies to access and share more information (e.g. data, text, photos, and video), greatly enhancing situational awareness.

## LOOKING AHEAD: UNDERSTANDING THE PUBLIC SAFETY BROADBAND NETWORK

In 2012, the Middle Class Tax Relief and Job Creation Act was enacted, which established the First Responder Network Authority (FirstNet), authorizing it to establish a single, nationwide public safety broadband network for public safety. The Act set aside spectrum in the 700 megahertz (MHz) band[8] to deploy the network,[9] and designated funding to build and deploy the network nationwide. The goal of this project is to ensure that first responders, at all levels of government, across all disciplines, and jurisdictions can communicate as needed during emergencies.[10] While public safety agencies are looking forward to, the deployment of a single, nationwide network, dedicated to public safety, there are several issues that state and local officials must be aware of when making funding decisions.

First, the development and deployment of the nationwide public safety broadband network (NPSBN) is expected to take several years. Therefore, it is necessary for state and local governments to continue to sustain LMR systems throughout the development and deployment of the NPSBN, to ensure first responders can continue to communicate during emergencies and natural and man-made disasters.

Secondly, while the NPSBN is expected to offer advanced data capabilities and data features, such as messaging, image sharing, video streaming, data storage, and applications, it will not offer mission critical voice capabilities from the outset. Therefore, it is necessary for state and local governments to continue to support current systems and solutions that support mission critical voice, until reliable and secure voice capabilities can be offered through the NPSBN.

Figure 3 below depicts the eventual convergence of LMR networks with broadband technologies at some point in the future, but acknowledges that the timeline for the transition is undetermined and indefinite. Public safety agencies argue that current systems providing mission critical voice and communication capabilities (i.e., LMR systems) must be maintained and sustained until similar capabilities can be offered through broadband networks (e.g., commercial wireless networks, or the NPSBN). State and local officials should be aware that while regular voice capabilities are available through commercial broadband networks, technologies that ensure more reliable, robust, and secure mission critical voice capabilities needed by public safety are not yet available, and will not be available initially on the NPSBN.

Figure 3. Public Safety Communications Evolution
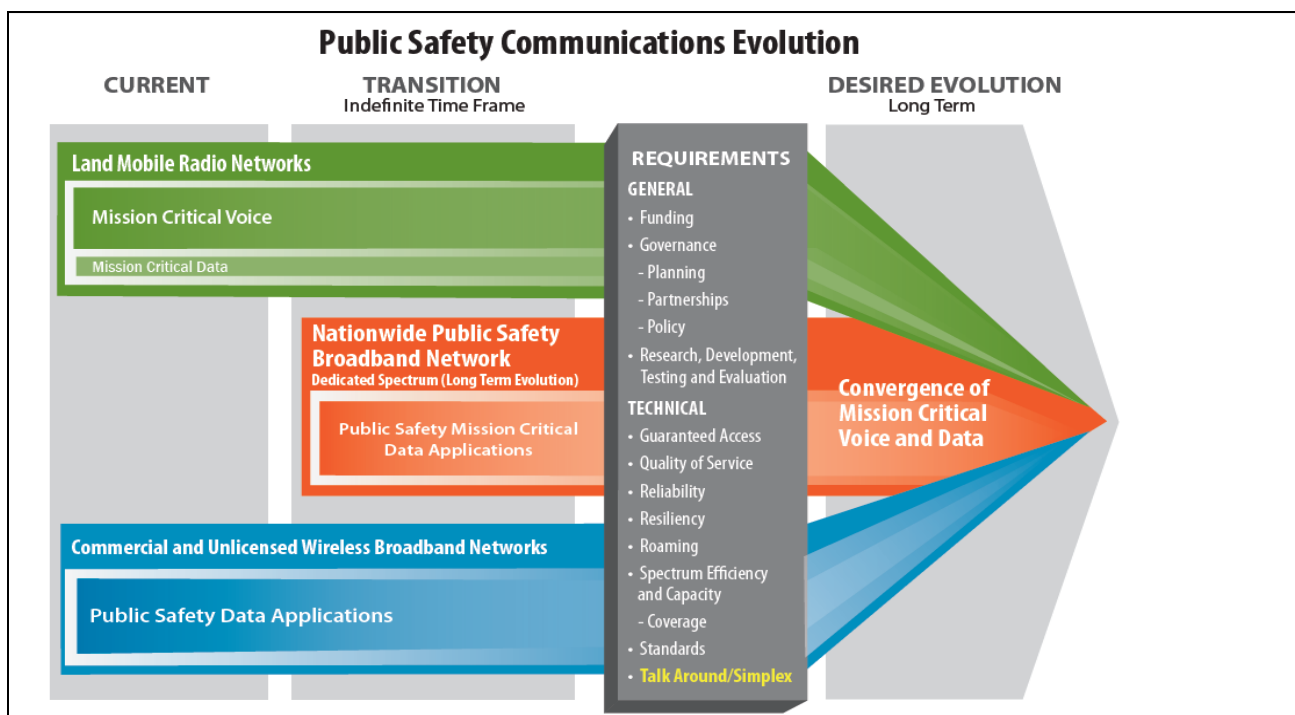
 Source: DHS Public Safety Evolution Brochure

GUIDANCE FOR ENTITIES INTERESTED IN INVESTING FEDERAL FUNDS IN BROADBAND

With the recent commencement of the NPSBN planning, many public safety agencies have expressed interest in investing federal funds in broadband-related projects. However, there are many aspects of the NPSBN that are still under development, including network architecture, coverage requirements, technical requirements, deployment and operations plans, and funding strategy.[11] Therefore, many federal granting agencies are advising grantees to avoid acquisition of broadband equipment (i.e., Long Term Evolution [LTE] equipment),[12] until there is further guidance from FirstNet on network architecture and requirements. Following this guidance will help to ensure that any investment of funds in broadband technology will complement the deployment of the NPSBN and will support state broadband plans currently being developed by states in consultation with FirstNet.[13]

Entities are encouraged to target grant funding toward planning and outreach activities (e.g., community outreach, documenting user needs), and to work with the State Single Point of Contact (SPOC)[14] and other state officials (e.g., State Administrative Agency, Statewide Interoperability Coordinator [SWIC])[15] in planning for broadband and other advanced technologies. Such planning activities may include, but not be limited to:

- Attending statewide or regional broadband planning meetings
- Establishing a governance structure, or expanding existing structures, to consult with FirstNet
- Preparing a comprehensive plan as part of the existing Statewide Communication Interoperability Plan (SCIP), or similar plan, describing the public safety needs that the State/territory expects FirstNet to address in its design of the NPSBN[16]
- Developing procedures to ensure regional, local, tribal representation and participation in the FirstNet consultation process
- Ensuring that all necessary planning and tribal consultation for Federal environmental, historic preservation and cultural resources statutory compliance will occur
- Creating and implementing a process for education and outreach among regional, local, and tribal officials, public safety users, and other stakeholders about the NPSBN

EXCEPTIONS TO THE RULE: ENTITIES HOLDING SPECTRUM LEASE AGREEMENTS

There are certain entities that have approval from FirstNet to proceed with broadband acquisition and deployment. These entities have been granted spectrum access and permission to proceed with planned broadband projects funded under the Broadband Technology Opportunities Program (BTOP) and/or the Department of Homeland Security (DHS), awarded prior to the Middle Class Tax Relief and Job Creation Act. They have been granted spectrum management lease agreements, and have been asked by FirstNet to fulfill specific Key Learning Conditions (KLC) that will inform the future deployment of the NPSBN.

FirstNet made a determination that these "early builders" of broadband projects could offer valuable lessons learned that could help inform the development and deployment of the NPSBN. Entities with lease agreements include:

- Los Angeles Regional Interoperable Communications System (LA-RICS)
- State of New Mexico
- Adams County, Colorado
- State of New Jersey
- State of Texas

Because these entities had projects underway, and have authority to operate in the FirstNet spectrum, these entities may use federal funding to support their broadband deployment. These investments continue to be reviewed carefully to ensure they support the statewide plan to deploy broadband and the federal goals for these pilot projects.

All other entities without authority to operate in the spectrum (i.e., those without a lease agreement with FirstNet), should not be requesting federal funds for broadband LTE) infrastructure equipment. Entities should be targeting funding toward broadband planning, governance, outreach, and education. Once the state plans are complete, and once FirstNet has more formal plans for the network, federal funds may be able to be used for broadband projects.

GUIDANCE TO ENTITIES INTERESTED IN INVESTING IN OTHER-THAN-LTE EQUIPMENT[17]

In the past, some public safety agencies have leveraged non-LTE wireless broadband technologies (e.g., Wi-Fi, [18] WiMAX,[19] mesh networks[20]) and other commercial broadband services to supplement their current communications. These solutions, which are either agency-owned or provided by a commercial carrier, allow agencies to access non mission critical voice, as well as data, video, and other applications.

However, given ongoing advancements in the NPSBN deployment, public safety entities should consider the overall impact of leveraging other-than-LTE broadband technologies at this time. First, LTE has been identified as the chosen standard for public safety broadband communications. The Middle Class Tax Relief and Job Creation Act established LTE as the standard for the NPSBN. LTE was endorsed by public safety organizations for economies of scale, radio frequency use, and spectral efficiency reasons. Moreover, major wireless service providers chose LTE for their broadband data services and in 2010, the FCC designated LTE as the required technology for the NPSBN.[21] Secondly, it is important to note that other wireless broadband technologies do not interoperate with LTE.

With these cautions, public safety entities should consider the impact of other-than-LTE investments in broadband and focus on activities and solutions that will help agencies plan and prepare for the deployment of the NPSBN. Entities are strongly encouraged to work with their state's SWIC, the FirstNet SPOC for the state,[22] federal granting agencies, and commercial providers to ensure grant-funded systems are compatible and interoperable with current and future solutions.

CONCLUSION

Planning for the NPSBN is underway. Public safety agencies interested in investing in broadband technologies should engage in planning for broadband, but understand five important points regarding acquisition and deployment of broadband equipment:

The NPSBN is in the early stages of development; public safety agencies should engage in planning efforts. The federal government is in the planning stages for the NPSBN; public safety agencies should coordinate with state broadband planners, participate in planning sessions, and discuss whether the proposed project supports the state's plan for public safety broadband use.

Agencies with lease agreements with FirstNet may be able to use grant funds for acquisition and deployment. Some public safety agencies have permission (i.e., a lease agreement) to deploy a public safety broadband project. These projects are expected to inform the future deployment of the NPSBN, and may be able to use grant funds to support their project.

Many federal agencies will not support acquisition and deployment if the grantee does not have a lease agreement in place. Many federal agencies will not support acquisition and deployment of broadband equipment and systems unless agencies have access to the 700 MHz public safety spectrum (i.e., a lease with FirstNet) or until there is further guidance from FirstNet.

Public safety agencies leveraging commercial networks to supplement public safety communications should exercise caution on major acquisitions, as they may not integrate with the NPSBN. Many public safety agencies are using commercial broadband services, and investing in other broadband technologies to support public safety communications. Agencies should exercise caution in investing in non-LTE equipment that may not integrate into the NPSBN.

Public safety agencies should continue to sustain LMR systems. Public safety agencies should continue to sustain LMR systems to ensure first responders can access mission critical voice communications, as these capabilities may not be immediately available on the NPSBN.

ABOUT SAFECOM AND NCSWIC

SAFECOM was formed in 2001 after the terrorist attacks of September 11, 2001 as part of the Presidential E-Government Initiative to improve public safety interoperability, allowing emergency responders to communicate effectively before, during, and after emergencies and disasters. SAFECOM's mission is to improve designated emergency response providers' inter-jurisdictional and inter-disciplinary emergency communications interoperability through collaboration with emergency responders across Federal, State, local, tribal, and territorial governments, and international borders.is a public safety stakeholders. SAFECOM's membership includes 70 members representing federal, state, local, and tribal emergency responders, elected and appointed officials, and major intergovernmental and national public safety associations, who bring years of experience and expertise to the public safety community, and who provide input and feedback on the challenges, needs, and best practices of emergency communications.

The National Council of Statewide Interoperability Coordinators (NCSWIC) was established in July 2010. The NCSWIC is comprised of Statewide Interoperability Coordinators (SWIC) and their staff from 56 states and territories. NCSWIC assists State and territory interoperability coordinators with promoting the critical importance of interoperable communications and the sharing of best practices to improve interoperable communications across the nation.

This document was developed by the SAFECOM/NCSWIC Funding and Sustainment Committee. This document reflects the expertise of SAFECOM and NCSWIC members, and the coordination efforts of DHS OEC. The SAFECOM/ NCSWIC Funding and Sustainment Committee will continue to update and provide information for decision-makers responsible for funding emergency communications systems and equipment.

For questions on this document, please contact SAFECOM or NCSWIC:

SAFECOM: SAFECOMGovernance@hq.dhs.gov

NCSWIC: NCSWICGovernance@hq.dhs.gov

Resources for Entities Interested in Investing in Broadband Technologies

2015 SAFECOM Guidance for Emergency Communications Grants
The SAFECOM Guidance provides information on the current state of broadband, federal guidance for grantees interested in investing in broadband, and broadband activities that grantees can pursue in the near-term. Decision makers and grantees should read the SAFECOM Guidance carefully, encourage compliance with the recommendations contained therein, and should encourage coordination with the SWIC and the FirstNet SPOC for any projects proposing investment in broadband. Decision makers should ensure that grant applicants comply with the recommendations in the SAFECOM Guidance, as it is a condition of grant funding for grants, and represents best practices in emergency communications.

Information Bulletin #386
This is formal guidance to DHS grantees regarding the use of DHS funds for broadband investments.

Public Safety Communications Evolution Brochure
The DHS Office of Emergency Communications (OEC) developed this brochure in collaboration with SAFECOM and the National Council of Statewide Interoperability Coordinators, with the support and input of public safety officials at multiple levels of government across the country. This brochure: (1) helps educate the public safety community and elected and appointed officials about the future of emergency communications; (2) Describes the evolution of emergency communications and how traditional LMR communications used today may converge with wireless broadband in the future, if specific requirements are met; (3) discusses some of the most important requirements to achieve the desired long term state of convergence with LMR networks.

FirstNet Elected Officials Fact Sheet
This fact sheet prepared by FirstNet provides an overview of FirstNet, the nationwide public safety broadband network, and roles and responsibilities.

April 2015 FirstNet Stakeholder Presentation
This presentation provides an update on FirstNet activities to date, including updates on state consultations, progress toward milestones, and development of Request for Proposal for acquisition and deployment of the NPSBN.

Interoperability Planning for Wireless Broadband
Technical Guide for public safety practitioners planning for broadband.

Application of Emerging Wireless Broadband Technology for Public Safety Communications
FCC Tech Topic #22 on broadband applications to public safety, and recent trends.

Standards for Other Broadband Technologies: FCC Tech Topic #11: WiMAX Applications for Public Safety

Broadband Technology Opportunities Program (BTOP)
Department of Commerce grant program, that was funded under the American Reinvestment and Recovery Act (ARRA), and which funded seven public safety broadband projects, four of which are serving as pilot projects for FirstNet.

FirstNet LMR Fact Sheet
This Fact Sheet discusses how the FirstNet Network will work with current LMR systems, and the need for continued investment in legacy LMR systems to preserve voice capabilities while the network is being developed.

End Notes

[1] [GAO-07-301: First Responders Much Work Remains to Improve Communications Interoperability](.).p.6.

[2] [GAO-07-301: First Responders Much Work Remains to Improve Communications Interoperability](.).p.6.

[3] [GAO-07-301: First Responders Much Work Remains to Improve Communications Interoperability](.), p.7.

[4] [GAO-07-301: First Responders Much Work Remains to Improve Communications Interoperability](.), p.8.

[5] Broadband refers to high-speed data transmission in which a single connection can carry a large amount of data at once. Broadband allows users to access information via the Internet through one of several high-speed transmission technologies (e.g., cable provided by a cable TV provider, DSL provided by a local telephone company, fiber provided by an Internet Service Provider). The Federal government was charged in 2012 with building a nationwide public safety broadband network (NPSBN).

[6] These are networks that are typically owned and operated by a municipality, public utility, or by a council of governments in a region.

[7] Bandwidth is the width of a communications channel, and determines the information-capacity of a telecommunications channel.

[8] The 700 MHz band is a segment of the radio spectrum that has been designated for public safety use, as stated in the Middle Class Tax Relief and Job Creation Act.

[9] The [9/11 Commission Report](.) made a recommendation that Congress should support pending legislation which provides for the expedited and increased assignment of radio spectrum for public safety purposes (p. 397). See: http://www.9-11commission.gov/report/911Report.pdf.

[10] The nationwide network was established by law, through the enactment of the Middle Class Tax Relief and Job Creation Act which authorized the creation of FirstNet, and the establishment of a single, nationwide network for public safety. For more information see: http://www.gpo.gov/fdsys/pkg/PLAW-112publ96/content-detail.html.

[11] 11 FirstNet is in the process of developing formal documents for the procurement of the NPSBN. See: https://www.fbo.gov/index?s=opportunity&mode=form&id=0a78db17dc3ade1848a16f168fa697dd&tab=core&_cview=1.

[12] Long Term Evolution (LTE) is a standard for wireless communication that supports high-speed data and roaming for mobile phones and handheld devices. LTE was established by the 3rd Generation Partnership Project (3GPP), and was adopted as the standard for which the nationwide public safety broadband network will be built.

[13] For more information on the state consultation process, see: http://www.firstnet.gov/consultation.

[14] States that received Department of Commerce State and Local Implementation Grant Program (SLIGP) funds have a SPOC in place. To find your SPOC, see: http://www.firstnet.gov/consultation#State Single Points of Contact (SPOC).

[15] To find the SWIC for your state, contact OEC at oec@hq.dhs.gov.

[16] For more information on the SCIP, see: http://www.dhs.gov/statewide-communication-interoperability-plans

[17] This guidance is included in the [2015 SAFECOM Guidance on Emergency Communications Grants](.), Appendix B-8.

[18] Wi-Fi stands for "wireless fidelity." Wi-Fi allows for the deployment of local area networks (LANs) without wires for connecting devices, typically reducing the costs of network deployment and expansion. Wi-Fi is a low power wireless system that uses unlicensed radio frequency that is attached to a LAN, which is then attached to the Internet through a cable modem, DLS router or phone line. These are often the systems used in coffee shops, hotels, airports.

[19] WiMAX operates similar to Wi-Fi but at higher speeds and over greater distances and for a greater number of users. For WiMAX, users can access the Internet from farther away, without a phone line or other wired line, using a card inserted in their laptop, or can access the Internet through a modem that is attached to, for example, an antenna on the roof of a house. WiMAX has the ability to provide service in hard-to-reach areas. WiMAX can enable two hotspots to be created and linked, creating a mesh network.

[20] Mesh networks are like ad-hoc networks, where individual nodes (hotspots) are deployed and linked, providing an ad-hoc network for users, who may not have service.

[21] FCC, 700 MHz Public Safety Spectrum: http://www.fcc.gov/encyclopedia/700-mhz-spectrum.

[22] For the FirstNet SPOC list, see: http://www.firstnet.gov/consultation#State Single Points of Contact (SPOC).