

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the matter of)	
)	
Broadband Deployment in Rural and)	GN Docket No. 09-47
Tribal Areas and Broadband)	GN Docket No. 09-51
Communications To and From)	GN Docket No. 09-137
Persons With Disabilities)	

COMMENTS OF MOTOROLA, INC. – NBP PUBLIC NOTICE #14

Steve B. Sharkey
Senior Director
Regulatory and Spectrum Policy

Robert D. Kubik, Ph.D.
Director, Relations Telecom Global
Global Government Affairs

Motorola, Inc.
1455 Pennsylvania Avenue, NW
Washington, DC 20004
TEL: 202.371.6900

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Motorola, Inc. (“Motorola”) respectfully submits these comments in response to the above-captioned Public Notice issued by the Federal Communications Commission (“Commission”) that seeks further comments on broadband deployment in rural and tribal areas as well as targeted information regarding broadband communications to and from persons with disabilities.¹ These comments add to information filed previously by Motorola in other phases of the Commission’s broadband proceedings and should be considered in conjunction with those earlier filings.²

¹ Comment Sought On Public Safety Issues Related To Broadband Deployment In Rural and Tribal Areas and Broadband Communications To and From Persons With Disabilities NBP Public Notice # 14, DA 09-2369, released November 2, 2009 (“Rural and Tribal Areas Public Notice”).

² See e.g., Comments of Motorola, GN Docket No. 09-51, submitted October 23, 2009 (“Motorola’s Broadband Spectrum Comments”); Comments of Motorola, GN Docket No. 09-51, submitted June 8, 2009 (“Motorola’s Broadband Plan Comments”). See also, Comments of Motorola – NBP Public Notice #8, GN Docket 09-47, submitted November 12, 2009 (“Motorola’s NBP PN #8 Comments”); Comments of Motorola, GN Docket No. 09-47, GN Docket No. 09-137, submitted October 2, 2009 (“Motorola’s Smart Grid Comments) and Comments of Motorola, GN Docket No. 09-157, GN Docket No. 09-51, submitted September 30, 2009 (“Motorola’s Innovation Comments).

Summary:

Regardless of where they are located, all first responders need access to video and data applications to enhance their ability to protect the public as effectively and efficiently as possible. Wireless broadband networks designed specifically for public safety applications are critical for achieving that goal. Such networks will not be built until an adequate quantity of spectrum is made available.

In these comments, Motorola again urges the Commission to address this situation by working with Congress to facilitate the reallocation of the Upper 700 MHz D Block to public safety use. Combining this spectrum with the spectrum already allocated for public safety broadband use will have significant benefits for the provision of public safety broadband services in rural and tribal areas because increasing the amount of spectrum available for wireless broadband networks will reduce the amount of base sites needed to provide broadband services throughout a given area. The need for fewer sites will reduce, but not eliminate, the amount of Federal grants that will be needed to ensure rural and tribal area coverage and help maximize the effective use of spectrum.

These points are amplified and clarified in the following responses to the Commission's specific questions raised in the Rural and Tribal Areas Public Notice.

Public Safety Broadband Deployment in Rural and Tribal Areas:

1) Are adequate broadband services available for public safety use in rural and tribal areas?

Clearly, adequate broadband services are not currently available for public safety use in rural and tribal areas or most areas of the country, as noted in responses to previous notices in this proceeding. That is why there is tremendous response to broadband stimulus grants and loans that have been made available to support the construction of advanced broadband networks in rural, unserved and underserved areas.³

With regard to mobile broadband services, public safety lacks the spectrum and, in many cases, the funding to deploy broadband networks that meet the minimum requirements for mission critical applications. This impacts routine public safety services that are performed on a daily basis as well as non-routine incidents that require multi-agency response from outside jurisdictions. The National Broadband Plan must emphasize broadband deployment in rural and tribal areas because disasters and incidents that require multi-agency response are not isolated to urban areas.

³ In the American Recovery and Reinvestment Act of 2009 (“ARRA”), Congress has made available more than \$7 billion in grants and loans for the deployment of advanced broadband networks in rural, unserved and underserved areas. *See* Department of Agriculture, Rural Utilities Service, Department of Commerce, National Telecommunications and Information Administration, Broadband Initiatives Program and Broadband Technology Opportunities Program, Notice of Funds Availability, 74 Fed. Reg. 33104, 33105 (Jul. 9, 2009) (“NOFA”). During the first filing window that expired in August of 2009, the Rural Utilities Services (“RUS”) and the National Telecommunications and Information Administration (“NTIA”) received almost 2,200 applications requesting nearly \$28 billion in the first round of funding. *See* Press Release, *Commerce and Agriculture Announce Strong Demand for First Round of Funding to Bring Broadband, Jobs to More Americans* (Aug. 27, 2009) (available at http://www.ntia.doc.gov/press/2009/BTOP_BIP_090827.html).

2) *What broadband applications and services are most important to public safety agencies operating in rural and tribal areas?*

In its response to the Commission's recent public notice seeking comment on the public safety, homeland security, and cybersecurity aspects of the National Broadband Plan, Motorola noted that public safety use of broadband networks is currently limited but that some users are now conducting the following applications over wireless networks:⁴

- Video / Picture delivery to mobile police cars and other vehicles
- Video sharing from mobile police cars and other vehicles
- Download of in-car video capture
- Mobile office applications – writing tickets, reports, database lookup
- Incident scene/event management – video and data network based coordination
- Automatic Vehicle Location/Computer Aided Dispatch (AVL/CAD)
- Automatic license plate reader updates

Once sufficient spectrum is made available for the deployment of wireless broadband networks capable of offering public safety grade service, these services will evolve into mission critical broadband applications for public safety users in all areas of the country, including rural and tribal areas.

The deployment of wireless broadband networks designed for rural and tribal areas differs from those in urban areas because coverage, and not necessarily capacity, is the prime consideration. Rural and tribal public safety officials are typically required to patrol more square miles than their urban counterparts. Also, smaller work forces require rural and tribal first responders to respond to incidents often without backup support and

⁴ Motorola's NBP PN #8 Comments at 4, 5.

at great distances to administrative assistance. In these cases, the wireless broadband link is a critical tool for protecting the public and the responder.

These factors necessitate that the coverage requirements for rural public safety networks be based on area and not population. However, providing broadband coverage across large unpopulated rural and tribal areas raises cost concerns. It is therefore critical to balance the coverage of each cell site and the broadband data rates at the edge of coverage to match the requirements in rural and tribal areas.⁵

The Commission should therefore recommend to Congress that it should reallocate the Upper 700 MHz D Block to public safety so that 20 MHz of spectrum is available for wireless broadband network deployment in rural areas. Based on 3GPP studies, Motorola estimates that cell sites in a wireless broadband LTE-based network that has access to 10+10 MHz will realize 24 percent to 49 percent increase in coverage area over sites that are part of a 5+5 MHz network.⁶ Increased frequency diversity results in less self-interference which improves performance and coverage within the cell. Motorola also estimates that 10 + 10 MHz cell edge capacity will be over 1 Mb/s as compared to only 300 kb/s for 5+5 MHz LTE, which translates to over 3 times the cell edge capacity.⁷ This increased capacity is needed to support incident response at the cell

⁵ As Motorola previously explained, the available data rates at a cell edge can be significantly reduced when compared to locations within close proximity to the base station infrastructure. *Id.* at 6.

⁶ Using 3GPP TR 36.942 V8.2.0 (*Radio Frequency (RF) System Scenarios*) for derivation of cell edge throughput versus SNR and applying a 2-5 dB overall system gain improvement due to reduced self interference and scheduling improvements with the same loading conditions for 5 MHz versus 10 MHz channels, Motorola determined that the 10 MHz channels will have 24-49% increase in coverage over the 5 MHz channels.

⁷ A 10 MHz channel will have greater than two times the capacity of 5 MHz channels due to more degrees of freedom for exploitation of air interface by advanced

edge requiring multiple simultaneous broadband links. At the same time, providing a total of 20 MHz for public safety broadband services should satisfy needs for the foreseeable future.⁸ For these reasons, Motorola urges the Commission to work with Congress to reallocate the D Block for public safety broadband use.

3) Are there an adequate number of high-capacity (wireline or wireless) broadband connections linking together critical public safety facilities (e.g., police stations, fire departments, PSAPs, emergency operations centers, hospitals) in rural and tribal areas?

No, there are not an adequate number of high-capacity broadband connections linking together critical public safety facilities in rural and tribal areas. As stated in the response to question one, this statement is supported by the high level of interest in RUS and NTIA grant programs for broadband services.

4) How can the Commission ensure that rural and tribal areas are built-out as part of a nationwide 700 MHz wireless public safety broadband network? What incentives can be provided?

The principal design condition for public safety networks in rural areas is coverage based on geography and not population. This should be reflected in any new build-out rules adopted by the Commission that are applicable to the public safety nationwide network. At the same time, however, the Commission must not impose

antenna and frequency selective scheduling techniques and some gain due to control channel overhead efficiency reductions.

⁸ In addition to reallocating the D Block to public safety, the Commission must maintain the existing allocations for narrowband land mobile radio (“LMR”) service for public safety users. While broadband communications will be a very useful supplement to mission critical voice networks, LMR systems are designed with a very high degree of survivability during emergencies and retain functionality even in the most extreme circumstances due to features such as isolated site operation, unit-to-unit communications without any infrastructure, high sites with full hardening and generator support, and limited backhaul needs that allow for redundant backhaul feeds (e.g., cable and microwave). Replicating this level of service and functionality over broadband networks would significantly increase the costs for network operations.

unrealistic deadlines on public safety licensees for completing construction, especially in rural and tribal areas. Even if funding issues were fully resolved, it will likely take 10 years or more to complete network deployment over the entire country.

Also, as stated above, reallocating the Upper 700 MHz D Block from commercial to public safety use will result in fewer sites to cover a given geographical area and thus reduce the cost of networks covering expansive rural and tribal areas. However, this will not resolve the funding issue by itself.

Many rural areas lack the resources to build broadband wireless networks and existing grant and loan programs are inadequate to fill the gap. Although Congress plainly intended that Broadband Technology Opportunities Program (“BTOP”) would “improve access to, and use of, broadband service by public safety agencies”,⁹ public safety was given short shrift by the requirements for the first funding round, which essentially necessitated that a public safety entity act as a public network operator in order to receive broadband infrastructure funding. RUS and NTIA are now considering revised policies for subsequent application rounds of stimulus funding for broadband deployment and Motorola has recommended that NTIA modify its application requirements so that stimulus funds are available in sufficient size and scope to meet the broadband needs of public safety agencies.¹⁰ Even if NTIA’s BTOP program is amended as recommended, additional Federal funding mechanisms and assistance will be needed as the existing monies are insufficient to ensure nationwide broadband coverage. This should not be surprising or unexpected – all utility or public works initiatives that are of

⁹ ARRA § 6001(b)(5).

¹⁰ Comments of Motorola, Departments of Commerce and Agriculture, Docket No. 0907141137-91375-05, submitted November 30, 2009.

similar size and scale to the provision of nationwide public safety broadband services coverage have had some form of Federal assistance to subsidize rural build-out.

5) How can the Commission ensure that, as other national public safety initiatives (e.g., NG911) go forward requiring wireline or wireless broadband facilities, the requirements of rural and tribal areas are met?

The provision of NG911 services requires that 911 Public Safety Answering Points (“PSAPs”) have broadband access. Especially in rural and tribal areas, PSAPs will require funds for upgrading facilities and networks to be able to receive and decipher non-voice services. Fees generated by States for 911/E911 purposes should fund these upgrades. The Commission should work with Congress and the States to ensure that these monies are not used to fund projects unrelated to E911 upgrades.

7) Should commercial providers be required to provide public safety users with priority access to commercial broadband wireless and wireline facilities to the extent they are deployed within rural and tribal regions?

Telecommunications carriers have a history of providing priority access to public safety and government officials on a voluntary basis. For example, the Wireless Priority Service (“WPS”) facilitates wireless communications among national security officials, emergency responders, and individuals in critical infrastructure industries during emergencies.¹¹ Motorola believes that the Commission should first monitor the development of voluntary efforts for wireless broadband priority access for public safety users before adopting any mandatory requirements. However, it is important to recognize that priority access alone does not necessarily position a commercial system to meet public safety unique requirements for coverage, reliability and operational control.

¹¹ See e.g., <http://www.fcc.gov/pshs/emergency/wps.html>.

8) How would the spectrum demands of rural or tribal public safety broadband networks differ from those of networks operating in more densely populated areas? What can be done to ensure that the spectrum demands of rural and tribal public safety broadband networks are met, and that such networks are readily capable of being upgraded or expanded to support the many bandwidth intensive, technologically advanced broadband applications and services that public safety users may adopt in the future?

As noted throughout these comments, the primary need for public safety wireless networks in rural and tribal areas is coverage and providing more spectrum for such networks will allow for service throughout a region with fewer cell sites and, ultimately, less cost. At the same time, the lower user density in rural and tribal areas should mean that sufficient capacity will exist to accommodate future services that require even more bandwidth. Urban networks will likely have many more simultaneous users within a cell sector and, therefore, will need to maximize capacity through the installation of additional cell sites.

In addition to cost savings, rural and tribal areas networks using 5 + 5 MHz of spectrum will likely provide inadequate broadband data rates at the cell edge. This threatens emergency response at those locations where simultaneous users will quickly consume all of the available bandwidth. This problem will be exasperated in the future when video and data applications will require even faster data rates. Building the network with 10+10 MHz of spectrum today will not add significantly to site costs but will provide additional capacity to better accommodate these future applications.

9) Can unlicensed technologies, such as Wi-Fi, or licensed-light services, such as in the 3650 MHz band, play a role in public safety broadband deployment in rural or tribal areas? How might these technologies and services be made interoperable via the Internet or gateways with 4G technologies such as LTE or WiMAX deployed elsewhere? Can these technologies meet the security needs and provide other features that are required for public safety communications?

Unlicensed devices can serve as local area networks to extend broadband coverage. For example, if a vehicle is receiving broadband access via a wide area network, the broadband data can be redistributed to nearby public safety users using unlicensed devices. Otherwise, the use of Wi-Fi-type devices is limited to population centers and will likely have minimum impact in rural and tribal areas.

Higher powered TV White Space devices could help expand the coverage and capability of unlicensed devices and possibly address backhaul needs. In rural and tribal areas, TV White space spectrum will be in a more abundant supply than in metropolitan areas. The large amount of spectrum potentially available on an unlicensed basis will facilitate the deployment of a wide variety of cost-effective broadband solutions. For that reason, unlicensed white space devices offer promise for helping this nation provide wireless broadband service to underserved and rural communities. The Commission should quickly resolve the pending petitions for reconsideration so that the devices can begin accessing this valuable asset.

10) Would different technical restrictions (such as higher permitted transmitter power levels, and higher permitted cell sites) be appropriate for network deployment in rural or tribal areas? Under what conditions should these different restrictions apply and what should they be? We note that commercial wireless systems are already permitted to use somewhat higher power in rural areas. Also, what can be done to improve two-way wireless communications in rural or remote areas, where finding a return path for communications back to the transmitter may be difficult for operators of low-power, low-altitude handsets?

Land mobile radios with higher power and full wave length antennas are ideal for two-way wireless communication over extremely wide areas. Raising the power limits on broadband networks will increase coverage; however compatibility with adjacent networks must be considered. Allowing broadband mobile devices designed specifically for public safety and other professional uses to operate with higher power will also increase usability and coverage. For example, a 2 watt mobile device that is powered from a car battery will have significant better coverage than a handheld commercial unit operating at a maximum of 200 milliwatts.¹²

11) Should rural and tribal public safety entities be permitted to enter into partnerships to share spectrum or infrastructure, such as with federal agencies, commercial providers, or critical infrastructure providers? How should the Commission's control rules and precedent be applied to such partnerships, or be modified to accommodate such partnerships, and how should network access (i.e., for public safety communications) be prioritized?

Not only should public safety users be permitted to enter into partnerships to share spectrum or infrastructure with entities such as federal agencies, commercial providers or critical infrastructure providers, the practice should be encouraged. As Motorola has indicated throughout these comments, rural and tribal area agencies will be under extreme pressure to find available sources of funding to help with system construction. Any cooperative arrangements or synergies with other similarly situated

¹² LMR car radios typically operate with up to 35 watts and provide even greater coverage.

entities should be promoted so that the level of direct Federal funding needed to support nationwide coverage is minimized. Motorola believes that the details of these partnerships, including the terms for public safety access, are best defined by the parties involved so that local circumstances can be better accommodated.

12) Are there any means for rural or tribal public safety agencies to obtain access to commercially licensed spectrum or associated infrastructure? Are there opportunities to acquire spectrum through secondary market transactions (e.g., the partition or disaggregation of licenses or spectrum leasing) or other arrangements with commercial licensees? Are there existing or planned municipal wireless networks in rural or tribal areas that may be leveraged for public safety use?

Assuming that 700 MHz broadband spectrum will soon be made available for public safety use across the country, access to spectrum will not be the primary concern for rural and tribal areas. Funding network construction will become the top priority. In any event, Motorola does not believe that the Commission should rely on secondary markets or municipal wireless networks operating on unlicensed frequencies to accommodate public safety's mission critical broadband needs. The critical nature of the communications, coupled with the need to ensure interoperability and roaming capability, requires dedicated allocations to public safety.

Motorola does believe that there will be opportunities for public safety to leverage commercial infrastructure and operations to help with build-out in rural and tribal areas. These partnerships should be encouraged and supported with the oversight of the public safety broadband licensee – assuming that public safety broadband spectrum is involved.

13) To what extent are rural and tribal Public Safety Answering Points (PSAPs) able to access broadband applications and services, and what can be done to improve that access? Are there unique economic and social issues or concerns that affect choice of technology or services as deployed?

As previously stated, fees generated by States for 911/E911 purposes should fund these upgrades. The Commission should work with Congress and the States to ensure that these monies are not used to fund projects unrelated to E911 upgrades.

15) What role can deployments in the 4.9 GHz band play in augmenting public safety broadband communications in rural or tribal areas, particularly during emergencies or other large-scale events? What needs to be done to ensure that deployment of 4.9 GHz technologies occurs in rural and tribal areas?

The 4.9 GHz band can be used to provide supplementary service around a vehicle that is receiving broadband service from a wide area network. The band can also be used for backhaul once broadband base sites are deployed. However, due to the small coverage area of 4.9 GHz devices, it would be cost prohibitive to rely on this band for wide area broadband coverage in rural or tribal areas.

Conclusion:

Public safety users in rural and tribal areas will face difficult funding challenges to build broadband networks suitable for mission critical applications. The Commission can help matters by encouraging the reallocation of the Upper 700 MHz D block spectrum to public safety which will help reduce overall infrastructure costs. Even so, additional Federal funding programs will be needed to achieve nationwide coverage within the next 10 years or so.

Respectfully submitted,

By: /S/ Steve B. Sharkey
Steve B. Sharkey
Senior Director
Regulatory and Spectrum Policy

By: /S/ Robert D. Kubik
Robert D. Kubik, Ph.D.
Director, Relations Telecom Global
Global Government Affairs

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