Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Service Rules for the 698-746, 747-762 and 777-792 MHz Bands	)	WT Docket No. 06-150
	)	
Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band	)	PS Docket No. 06-229
	)	
Amendment of Part 90 of the Commission's Rules	)	WP Docket No. 07-100

COMMENTS OF THE SAN FRANCISCO BAY AREA IN RESPONSE TO THE THIRD REPORT AND ORDER AND FOURTH FURTHER NOTICE OF PROPOSED RULEMAKING

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EXECUTIVE SUMMARY

The Bay Area appreciates the 3rd Order and applauds the Commission for adopting Long Term Evolution (LTE) as the technology standard for the nationwide broadband network. The Bay Area believes that mandating a common technology platform will be the first building block towards achieving a compatible nationwide system, but also realizes that other requirements need to be adopted and met before interoperability is fully realized. The Bay Area believes that further rules are needed to ensure full compatibility of equipment and systems, beyond simply adopting LTE as the technology standard.

The Bay Area is actively working to establish a regional network, which we intend will interoperate with a nationwide public safety broadband network. The Bay Area is in the midst of establishing a regional governance structure as well as developing the technical requirements, the operational needs, and a sustainable business model for the regional network.

The comments below are a clear indication of the Bay Area's thoughts for ensuring compatibility with its network and interoperability across all systems as the country moves forward with the build out of a nationwide network. The Bay Area believes that it is important to provide feedback on all questions raised by the Commission in the *Third Report and Order and Fourth Further Notice of Proposed Rulemaking*. As such, the Bay Area addresses most of the concerns and provides feedback throughout the Comments.

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I. INTRODUCTION AND SUMMARY

The City and County of San Francisco, the City of Oakland, and the City of San Jose, on behalf of the San Francisco Bay Area Region (the Bay Area)[1], respectfully submit these comments in response to the *Third Report and Order and Fourth Further Notice of Proposed Rulemaking* in the above-captioned proceeding, released on January 26th, 2011 ("3rd Order" and "4th FNPRM", respectively).[2] In the 3rd Order and 4th FNPRM, the Federal Communications Commission ("Commission") adopts rules and seeks comments on further rules to create an

[1] The City and County of San Francisco, the City of Oakland, and the City of San Jose were joint Petitioners in the "Matter of Waiver of Various Petitioners to Allow the Establishment of 700 MHz Interoperability Public Safety Wireless Broadband Networks", FCC 10-79; PS Docket 06-229, and are subject to the Order adopted by the Commission in such proceeding on May 11, 2010.

[2] The following Bay Area jurisdictions have indicated that they support these comments: Alameda County, Marin County, San Mateo County, Santa Clara County, Sonoma County, City of Sunnyvale, and the Bay Area Rapid Transit District.

effective technical framework for ensuring the deployment and operation of a nationwide interoperable public safety broadband network.[3]

The Bay Area appreciates the 3rd Order and applauds the Commission for adopting Long Term Evolution (LTE) as the technology standard for the nationwide broadband network. The Bay Area believes that mandating a common technology platform will be the first building block towards achieving a compatible nationwide system, but also realizes that other requirements need to be adopted and met before interoperability is fully realized. The Bay Area believes that further rules are needed to ensure full compatibility of equipment and systems, beyond simply adopting LTE as the technology standard.

The Bay Area is actively working to establish a regional network, intended to interoperate with a nationwide public safety broadband network. The Bay Area is currently creating a regional governance structure as well as developing the technical requirements, the operational needs, and a sustainable business model for the regional network. These Comments reflect the Bay Area's thoughts for ensuring compatibility with its network and interoperability across all systems as the country moves forward with the build out of a nationwide network. These Comments are laid out by section, corresponding to the Commission's structure as developed in the 3rd Order and 4th FNPRM.

A.1 Architectural Framework

The Commission seeks comment on the architectural framework it has laid out within the 4th FNPRM. The Bay Area supports the Commission's endeavor to develop a uniform framework of standards, as that is what has been requested in earlier comments to the

[3] See (4th FNPRM) FCC 11-6, Page 2 Introduction

Commission from Bay Area entities[4]. The Bay Area believes the Commission has captured a current set of interoperability principles that can be used to begin the construction of regional systems. The Commission should also adopt a framework that allows for revision and update as technology, standards and requirements change. It is the Bay Area's opinion that the Commission's Emergency Response Interoperability Center (ERIC) should be charged with maintaining a current framework, in conjunction with the Department of Commerce's Public Safety Communications Research Group (PSCR) under the auspices of the National Institute of Standards and Technology (NIST). The Bay Area further requests that ERIC develop a way to continuously seek feedback from stakeholders, building regional networks, on their ongoing needs so as to not impose new or unnecessary requirements on network operators.

A.2 Architectural Guiding Principles

The Commission seeks comment on adopting architectural guiding principles for the nationwide public safety broadband network. The Bay Area agrees with the Commission's definition of the network characteristics, and discusses each of the principles listed as independent sections throughout these comments. The Bay Area believes that these items should be the basis for the network-of-networks architecture. In terms of sharing network resources and efficiencies, the Bay Area offers comment to this principle in Sections A.11, A.20, and B.4.

A.3 Open Standards

The Commission requests comments on the adoption of policies to enforce open standards. The Bay Area believes there are certain network requirements that must be adopted, open standards, specifically for LTE architecture, roaming, coverage reliability and quality of

4 See Comments of the City and County of San Francisco, California and the City of Oakland, California in Response to the 3rd FNPRM, Page 5, 11/3/2008

service (QoS). The Bay Area discusses these needs in Sections A.6, A.9, A.19 and B.1. Further, Interoperability Testing (IOT) is also a mechanism by which open standards can be achieved. The Bay Area supports a national approach to IOT testing, to ensure vendor equipment is compatible nationwide.

A.4 Technology Platform and System Interfaces

The Commission seeks comment on how to maintain interoperability among the network-of-networks, assuming multiple releases of the 3GPP standard. The Bay Area is interested in understanding the complications of interoperating across multiple technology releases, and intends to submit reply comments on this particular issue after reviewing the comments of others in this proceeding.

A.5 System Identifiers

The Commission seeks comment on the use of PLMN IDs within the public safety broadband network-of-networks. The Bay Area supports a single, common PLMN ID for the entire nationwide network, as long as it will serve the purposes of providing seamless nationwide roaming. Further, the Bay Area supports assigning a second PLMN ID for regional networks, as long as the concept is supported, technically and cost effectively, across industry. The Bay Area's preference is to have many device and infrastructure manufacturers support this standard, so it provides options in the market space. The Bay Area believes that the Commissions ERIC should be responsible for coordinating the acquisition of the PLMN IDs for the nationwide network and regional networks, in conjunction with the Public Safety Broadband Licensee (PSBL), which should assign the regional network PLMN IDs. Both organizations should receive technical guidance from NIST.

A.6 Roaming Configurations

The Commission seeks comment on the tentative conclusion that the public safety broadband network, and any portion of the network built out by regional entities, should support both local break-out and home-routed configurations. The Bay Area realizes that both of the standards are contemplated in the LTE standard. In that regard, the Bay Area supports the conclusion that both configurations be left up to the early network builder to choose based on the regional needs, in the broadband public safety network-of-networks. The Bay Area cautions that, as regional networks begin build-out and usage, if the cost to build and maintain each configuration proves not to be justified by the practical application of both scenarios, the Commission should be prepared to quickly reconsider this ruling. Only having limited knowledge of the technical and financial implications, Bay Area believes that the home routed configuration allows for more control over usage and applications. This may be in the best interest of Public Safety.

In terms of commercial and public safety roaming, the Bay Area does not support the blanket approval of commercial roaming on public safety networks. Allowing commercial usage on the public safety spectrum could lead to network overload in the event of a large scale event. This issue should be dealt with, on a case by case basis, in limited capacity, in a standardized roaming agreement, as discussed by the Commission in Section B.5 Proposed Model Agreement.[5]

[5] See (4th FNPRM) FCC 11-6, Section B-5 Proposed Model Agreement, paragraph 98.

A.7 Roaming Authentication and Internetworking Functions

The Commission seeks comment on nationwide roaming and how to technically and administratively handle the capability. The Bay Area believes that, if the intent is to have one nationwide public safety network, then a single third party clearing house is a preferred model. With a single clearing house, cost could be shared nationally and processes could be developed in conjunction with the build out of regional networks. This will also be in alignment with the single PLMN-ID implementation nationwide, and make the national interoperability easier.

While the Bay Area supports the clearing house model in concept, we are concerned that commercial and competitive pressures may unduly influence decisions made by clearing house operators. The proposed network-of-networks plan will likely result in some regional systems being owned and operated by commercial providers who compete directly with operators of other regional networks. In addition, roaming services and interconnections linking the regional networks may be provided by commercial network operators affiliated with one or more regional operators. We are concerned that a clearing house might be vulnerable to competitive pressures arising from the competitive dynamics of these parties. Such pressures could negatively affect not only pricing and costs of roaming and interconnect, but also the critical access, capacity and prioritization needs of public safety data traffic flowing among the regional systems. For this reason, clearinghouse services should not be affiliated with commercial broadband providers, and the Commission should develop rules to insulate clearing houses from competitive pressures.

The Bay Area recommends that, at minimum, a clearing house providing any public safety roaming or interconnect function should be a not-for-profit organization with the sole purpose of serving and representing the interest s of regional public safety users. Each clearing

house should have at least one public safety representative on its Board of Directors, and all Directors should be required to disclose any relationship with commercial broadband providers. In addition, all contracts, rates and operating costs should be transparent and open to examination by both the regional network operators and the public safety agencies they serve. Rules should be further implemented to ensure that the Commission has access to all such operational records and the ability to promptly act if and when remedial measures are necessary.

The Bay Area believes that ERIC in conjunction with its Technical Advisory Committee and Public Safety Advisory Committee, as well as the PSBL and the PSCR - Waiver Recipients Working Group should engage in discussions, develop criteria, and select a nationwide clearing house. The Bay Area believes that the PSBL, currently the Public Safety Spectrum Trust (PSST), in conjunction with its Operational Advisory Committee (OAC), should interface and exchange information on system issues directly with the selected clearing house. Further, the costs for the clearing house should be reviewed and assessed every year, allowing the flexibility to change the clearing house as needed. Clearing house fees could be shared across several entities, including the Federal Dept. of Commerce, the Commission's ERIC, and assessed within the lease payments that are paid by regional network operators and subscribers. Funds should be made available through a combination of sources including Department of Commerce general fund, the Commission in-kind support, as well as additional assessments within the lease payments paid by regional entities.

A.8 Interconnectivity of Regional or Tribal Broadband Networks

The Commission seeks comment on three different models to interconnect regional public safety broadband networks. Specifically these models are 1) a direct connection, 2) an

Internet connection or 3) a clearing house, outsourced model. The Bay Area does not support an Internet connection model, but thinks the dedicated model and clearing house model should be explored.

A.9 Prioritization and Quality of Service

The Commission seeks comment on how public safety broadband networks should support both prioritization and quality of service among connections as well as applications over these connections. The Bay Area is familiar with the technical mechanisms available to develop priorities for applications and users, but it cannot comment on whether certain features are being developed within LTE equipment. The Bay Area believes that an in depth analysis of these technical parameters can yield a standardized framework for nationwide intra-system roaming. Further, the Bay Area requests that the ERIC Technical Advisory Committee coordinate the development of this framework in conjunction with the Public Safety Spectrum Trust, Operations Advisory Committee, and Department of Commerce's PSCR, as well as private industry stakeholders. Further, it is imperative that the standardized framework that is developed be independent of the implementation of a mobile VPN solution, which is further discussed in Section A.16.

A.10 Mobility and Handover

The Commission seeks comment on how the public safety broadband network handles mobility and handoff across a network-of-networks. The Bay Area believes that such handoff functionality is a critical aspect. However, the questions asked are technical in nature and are best addressed by equipment manufacturers consistent with requirements mandated by the Commission. In terms of functionality, the Bay Area requirement is to have seamless handover

between radio sites, so end users experience no lapse in coverage, dropped sessions, etc. The functionality offered, at a minimum, must be similar to what is offered by cellular systems.

A.11 Out-of-Band Emissions and Related Requirements

The Commission requests comment on the adoption of the out of band limits for the broadband public safety network as it was adopted in the waiver order. The Bay Area believes that this discussion is technical in nature and is best addressed by radio engineers and RF coverage experts. That said, the Bay Area believes a nationwide standard should be adopted, to ensure all networks are designed to the same standard. Similarly, the Bay Area believes that two neighboring public safety networks need to be required to work out any interference or incompatibility between each entity, based on guidance provided by FCC rulemaking. The Bay Area believes that interference can be mitigated by the Commission if it adopts rules that foster the development of large regional systems. This concept is also applicable in the roaming discussion that the Commission seeks comment on in Section B.4.[6] Specifically, roaming, and the amount of roaming traffic generated will be minimized if a public safety network-of-networks span a large geographic area.

A.12 Applications

The Commission requests comment on a comprehensive, more expansive, list of applications that should be required to operate on the public safety broadband network-of-networks. The Bay Area feels that Virtual Private Networking in all of its forms should be required such that users have to access their home applications in a secure fashion. Further, any common applications on the network should be secured with SSL (Secure Socket Layer) and

[6] See (4th FNPRM) FCC 11-6, Section B-4 Volume of Roaming Traffic, paragraph 97

two-part authentications. In terms of the desired applications discussed in the 4th FNPRM and the NPSTC BBTF Report, the Bay Area encourages the Commission to consider additional features including Voice over Internet Protocol (VoIP) to support non-mission critical voice capability and non-mission critical Push-to-Talk. The Bay Area believes there has been significant work done towards developing the Voice over LTE (VOLT) technology and encourages the Commission to continue promoting this standards development, as it will only help public safety.

A.13 Interconnection with Legacy Public Safety Networks

The Commission requests comment on interconnection of the public safety broadband network with legacy public safety networks. The Bay Area has significant experience in connecting legacy and narrowband networks together using gateway technology. The Bay Area has found that although it is acceptable practice in certain situations, in many cases doing so detrimentally impacts the capabilities of the narrowband network. This is specifically the case in the instance of connecting a gateway to a trunked radio system, as it negatively impacts the capacity of the trunked radio system. In terms of the public safety broadband system, the Bay Area would not want the gateway solution to impact the capacity and capability of either network, the broadband network, or the legacy public safety network. To that end, more research should be done, and presented to the Public Safety community, to adequately answer the questions posed in the FNPRM.

A.14 Performance

The Commission seeks comment on setting baseline performance standards to ensure operability throughout the network of networks. The Bay Area believes that performance

standards, as measured by capacity, throughput, coverage and reliability, are necessary to ensure network operation at a level that will meet user requirements and maintain user satisfaction throughout the nation. The Bay Area believes that coverage requirements need to address both location availability and coverage connection reliability. An example of this requirement is that the system signal must cover 95% of a defined geographical area with 97% covered area reliability. That is, if the defined geographical area were divided in a grid pattern, 95 of every 100 grid squares would have location availability and, further, that attempts to connect to the network in those 95 grid squares would be successful 97 out of 100 times. Additionally, coverage requirements should specify that none of the failed grid squares can be contiguous. The Bay Area believes that, as a condition of obtaining a lease to build a network-of-networks, a clear definition of the geographical service area should be provided. A representative service area definition would read: "Coverage will be based on a 97% coverage reliability over 95% of the valley floor from the County A / County B border in the north to the County B / County C border in the south which encompasses all lands from the [highway designation] corridor up to the first ridge line at a [specified performance level], on-street and on a 97% coverage reliability over 95% of the balance of the County B at a [specified performance level] on-street." Yet another example is a requirement that systems attempt to provide coverage inside buildings, with a specified level of attenuation such as 15dB. All factors, including coverage, reliability, building attenuation and mobile versus stationary signal within a clearly defined geographical area, are necessary.

The Commission seeks comment on minimum data rates that should be set forth as standards, under certain loading conditions. The Bay Area believes that the minimum data rates

discussed by the Commission, 256 Kbps uplink (UL) and 768 Kbps downlink (DL) must only be edge data rates, and that the Commission should adopt rules that only a small percentage, i.e. 10%, of the coverage area can operate at such edge data rates. In addition, the Commission should further define seventy percent sector loading in terms of number of active users, sending a specified payload, averaged over a busy hour, to ensure all regional networks are designed with the same performance criteria across all sectors.

Empirically measured coverage and throughput rates, including the date of service availability, must be made continuously available to end users. This is needed in order to demonstrate to public safety users that the broadband network-of-networks performs without degradation or reduction in the level of service throughout the nation, as well as compared to what is offered by current commercial broadband data providers. Costs to meet this level of service availability should not affect the need to provide this level of service availability. Such costs should be well understood by any party seeking to create a broadband data network.

Performance metric requirements should be specified as minimum requirements, not average requirements. It is not obvious that various applications and usage scenarios should be considered in conducting performance tests of as-built networks. Regarding performance testing, while computer simulation may be used to estimate coverage from selected sites, as-built network testing must be based on actual drive test data. Coverage maps should be provided for each phase of network build. However, coverage maps which show site locations should be protected from public access (in California compilations of data may be exempt from the Freedom of Information Act under California Government Code §6254(aa)). Periodic reports,

coverage updates, and actual usage and traffic data should only be required by the Commission if they are similarly required from commercial broadband data service providers, notwithstanding the requirement for coverage maps during network build and for changes to the network following the date of service availability.

A.15 Network Capacity

The Commission seeks comment on the need to set minimum capacity requirements, in terms of spectral efficiency. The Bay Area believes that any network must be designed to support capacity for multiple interoperating agencies active at a single, localized incident. Minimum capacity requirements must accommodate the bandwidth needs at major incidents. The Commission should work with network engineers and equipment vendors to ensure that minimum capacity requirements not impede the ability of agencies to accommodate such need.

A.16 Security and Encryption

The Commission asks for comment on the proper security and encryption requirements that the network should be capable of, and lists five major requirements within the LTE standard. The Bay Area feels that these security requirements are a good starting point, but that the security and encryption needs of public safety also have to conform to state and federal requirements, including FIPS 140-2, Department of Justice, and NCIC requirements. This typically requires mobile VPN type solutions. The challenge with implementing mobile VPN solutions is that, if the data is end-to-end encrypted, it is difficult, if not impossible, to prioritize the network data, using QoS or the like. The Commission must consider this issue in its rulemaking.

A.17 Robustness and Hardening

The Commission seeks comment on requiring standards to ensure network resiliency. It is commonplace throughout the Bay Area to provide eight hours of battery backup for critical public safety communications systems. Further, it should be required at all network eNodeB and core sites. Solar power, while useful as an alternative source for main site operation or battery charging, is unacceptable as an alternative to battery backup. Backup power should be provided for all site equipment, including radio equipment and network/data equipment. Additionally, generator power is required for extended periods of AC mains power outage. Network operators should certify compliance with battery and generator power requirements to the Commission prior to the date of service availability. Costs for backup power, whether new installations or incremental increases at existing sites, should be borne by the network operator, as they would be by commercial data service providers.

A.18 Coverage Requirements

The Commission seeks comment on whether it should impose coverage and performance requirements on networks that impact the nationwide broadband public safety network. Further, the Commission discusses whether the coverage requirements should be based on population covered or area served. The Bay Area believes that, while population may be a valid criterion for decisions regarding capacity needs, a geographic definition is needed for coverage requirements. Coverage metrics should be based on clearly defined geographical areas as discussed above. Such coverage performance should be validated by empirical testing no later than thirty days after achieving service availability. Such certification should be reported to the Commission as should any ongoing certifications and all certifications should match those imposed on commercial data network providers

While population may be a valid criterion for decisions regarding capacity needs and the granting of licenses, public safety broadband networks need to cover clearly defined geographical areas which encompass a very high percentage of calls for service. Such coverage requirements cannot take fifteen years to achieve, but rather must be in place on the initial date of service availability in order for public safety agencies to transition from their then-current broadband data providers to the new network. Otherwise there will be no incentive for agencies to make that transition. Coverage performance in areas outside high population areas (i.e., outside areas of high volumes of calls for service) can be based on different criteria. In lieu of the Commission issuing a blanket requirement for rural network performance, each regional system can be reviewed based on its urban vs. rural makeup and special coverage needs.

A.19 Coverage Reliability

The Commission seeks comment on whether it should impose coverage reliability requirements throughout the network. The Bay Area clarifies that coverage and reliability are different metrics. Coverage defines where the network may work, while reliability defines connection success in coverage areas. As previously recommended, any communications network should demonstrate 95% coverage, most commonly determined by drive testing in a grid square pattern. Measured that way, 95 of each 100 grid squares should be covered and no two uncovered grid squares should be contiguous. Within each covered grid square, reliability requires that 97 of each 100 attempts to connect to the network be successful. Again, coverage must be clearly defined in geographical terms appropriate to the region in which the network will operate, as in the representative service area definition. In order to be competitive with the commercial broadband providers currently used by public safety agencies, public safety

networks contemplated by this NPRM must provide the same level of on-street AND indoor coverage. Rather than specifying different coverage and reliability metrics for indoor coverage, it is customary to specify the maximum building attenuation (e.g. 15dB) which will still provide minimum performance levels.

A.20 Interference Coordination

The Commission seeks comment on the process, procedures and technical requirements that should be imposed to address interferences throughout the nationwide public safety broadband network. While the Bay Area applauds the Commission for addressing these issues, the Bay Area intends to deploy an integrated broadband data network approach. The Bay Area believes this will limit the need for interference coordination. For this reason, the Bay Area recommends that the Commission adopt rules to encourage integrated systems that cover large geographic footprints, populations, and geo-political boundaries. This is further discussed in Section B.4 below.

A.21 Incumbent Narrowband Operation

The Commission seeks comment on narrowband operations, and relocating incumbent narrowband network operators. The Bay Area declines to comment on this section at this time.

B. Public Safety Roaming on Public Safety Broadband Networks

The Commission seeks comment on intra-system roaming and building the technical requirements and operational framework to support interoperability. The Bay Area agrees with the categories that the Commission has defined for roaming, specifically, Itinerant, Interoperability and Response Roamers, but believes that the classification may need to expand

as other needs become apparent. The Bay Area agrees with the Commission's conclusion that all public safety broadband network operators/providers must allow for public safety roaming, and must enter into standardized roaming agreements as further discussed in Section B.5

B.1 Prioritization and Quality of Service to Support Roaming

The Commission should provide a technical and operational framework to support prioritization and QoS across the network-of-networks. This should be done in a flexible manner allowing localities the ability to set user and application priorities. The Bay Area understands there are mechanisms within the LTE standard that are in place to develop this technical solution. These mechanisms include access class barring, guaranteed and non-guaranteed bearers, QCI and ARP. The Bay Area believes that an in depth analysis of these technical parameters can yield a standardized framework for nationwide intra-system roaming. Further, the Bay Area requests that ERIC coordinate the development of this framework in conjunction with the PSCR as well as industry. Further, it is imperative that the standardized framework that is developed be independent of the implementation of a mobile VPN solution, as discussed in Section A.16.

B.2 Applications to be Supported

The Commission seeks comment on the required applications that should be supported for public safety units roaming out of their home network. The Bay Area believes that the tentative list of applications to be supported by the system is sufficient.

B.3 Public Safety Roaming Rates

The Commission seeks comment on intra-system public safety roaming, and how to handle costs associated with functionality. The Bay Area comments that, ideally, the implementation of a national public safety system would eliminate the concept of intra-system roaming. In the absence of such a system, seamless roaming and access should be a requisite of all regional systems, in the network-of-networks concept. Supporting intra-system roaming units, and the respective roaming rates should be built into the cost of building and operating a regional system and not require the negotiation of separate roaming plans between each entity. The Bay Area would support an establishment of a threshold of roaming usage that, when met, could trigger the ability for cost recovery between the home network and the roaming network. To that extent, the Commission should work to establish a national protocol and roaming agreement to allow roaming and provisioning on to other public safety systems. Such roaming should occur automatically and without the need to re-provision devices.

B.4 Volume of Roaming Traffic

The Commission seeks comment on the volume of roaming traffic projected. The Bay Area believes that the Commission can assist in the minimization of roaming by implementing policy to keep the number of independent, regional systems to a minimum. The Commission may be able to accomplish this by establishing minimum service populations or require systems to be designed to service large, regional, geographical footprints. The Commission should also develop policy that requires users to be classified into the various categories of public safety discipline as well as the originating jurisdictional system. All systems should include the use of

QoS prioritization protocol. The protocol should allow system managers to assign a priority to roamers depending on the issue at hand.

B.5 Proposed Model Agreement

The Commission asks for comment on the creation of a standardized roaming agreement for the nationwide public safety network, assuming a network-of-networks approach to construction. The Bay Area agrees that the Commission's assistance in drafting a standard roaming agreement would improve the success of a nationwide system by facilitating roaming, facilitating nationwide interoperability, and reducing administrative burden. Local and regional variations in roaming policies will hinder the system and slow public safety's ability to respond to large emergencies requiring shared resources. The Bay Area believes that the FCC's Emergency Response Interoperability Center (ERIC) in conjunction with its Technical Advisory Committee and Public Safety Advisory Committee, as well as the PSBL and the Department of Commerce's Public Safety Communications Research - Waiver Recipients Working Group should work to develop such an agreement. The model agreement should contain provisions including how to implement intra-system and commercial roaming, including items related to a roaming clearing house, setting policies on priority, system usage frameworks, and thresholds for cost recovery for roaming, if needed.

C. Federal Use

The Commission asks whether conditions of the public safety broadband network should extend to Federal Use. The Bay Area supports interoperability between Federal Users and State/Local Government Users. Further the Bay Area supports the concept that Federal Users be

able to use the public safety broadband network as subscribers. In terms of the network-of-networks approach to the build out of the nationwide public safety broadband network, Federal Agencies should have the opportunity to participate in local governance entities, or planning areas, which are working toward a local, build out initiative. The Federal Agency, in that instance, would be consulting directly with the regional and tribal public safety network operator, which may avoid the need for the PSBL to coordinate with a locality. If a regional governance organization is not in place, the Federal Agency should be required to work toward establishing one, as a condition for obtaining a lease to construct and operate a portion of the network-of-networks. The Bay Area believes that it is these regional governance structures, or planning areas, that will set policy, determine priorities, and deal with issues relating to impacts of Federal Usage, or any local usage, on the public safety broadband network. These structures will also determine, collectively, the cost for system usage, and how any revenue generated is reinvested back into the network. The Federal Users would have to conform to the policies set for by the local governance structure. In terms of roaming, Federal Users would have the same capabilities for establishing priority and intra-system roaming as any state or local user would have and have comparable responsibilities.

D.1 Conformance Testing

In the Third Report and Order of Commission, the Conformance Testing, including the Interoperability requirements, is limited to the user devices, whereas all the LTE Network components and interfaces need to be tested for the end-to-end interoperability and 3GPP standards compliance. The certified labs identified in the Report and Order are formed by the Cellular Operators, for the purpose of testing roaming across the various networks. This is a reliable existing operating model, which could benefit the Public Safety community for its

specific testing needs. The time frame given after the Commission's release of BC 14 PTCRB testing process of six months is reasonable, and would be helpful in making the first batch of BC14 user devices available to the early builders. Further requirements of any future testing called for within the certification process may require specific definitions, testing scope, and long-term roadmap for public safety applications to avoid any ambiguity. At the current juncture, it is better for the Public Safety community to support the on-going activities of NIST. It could be a representative entity at PTCRB, whereas an inclusive process and funding need to be in place to have a good representation of stakeholders from federal, state, and local levels, helping the NIST in the PTCRB testing and certification process.

Since there are no formal conformance testing labs available for the LTE infrastructure equipment -- namely, EPC, including eNodeB, MME, SGW, PGW, and PCRF -- it may be advisable to encourage entities with such interest, private or public, to be developed for this purpose. A national framework needs to be developed, whose mission is to develop a structured evaluation and testing framework for verification of all systems, sub-systems, software components, interfaces and devices utilized in the 700 MHz Public Safety Broadband LTE Network. The evaluation and testing framework should not only focus on the conformance testing, but also include the following major testing areas:

- 3GPP Standards Compliance for current as well as future releases
- Functional Requirements (Mobility, Hand Off, End-User Performance, etc)
- Interoperability Components with Public as well as Private Networks
- Network Reliability and Availability
- Operations, Administration, and Maintenance

D.2 Interoperability Testing

The national public safety broadband LTE network will require several layers of testing, including geographic based testing, interoperability testing, performance reliability and availability testing, functional testing and standards compliance testing. On a local level, these tests may be the responsibility of the public safety support entities with assistance from those entities that will be responsible for implementing and operating the network. On a regional and national level, these tests may involve testing with private sector service providers and the federal government. As pilot network systems are deployed and tested, long range testing must be considered and planned well in advance.

The 3GPP LTE standards encompass a wide variety of feature sets and functions. What is relevant for public safety LTE use is that no new conformance specifications need to be developed and used for implementation.

Several of the 3GPP TS 36 series standards address testing as well as mobile and handoff issues.

The following specification directly relate to testing:

TS 36.141 Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing

TS 36.143 Evolved Universal Terrestrial Radio Access (E-UTRA); FDD repeater conformance testing

TS 36.508 Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing

TS 36.509 Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Special conformance testing functions for User Equipment (UE)

TS 36.521-1 Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing

TS 36.521-3 Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Radio Resource Management (RRM) conformance testing

There are other standards that must also be used for testing. TS 36.101 UE transmission and reception is necessary for general understanding of the network; similarly, TS 36.102 Base station transmission and reception.

TS 36.304 UE idle mode – refers to registration types, authentication procedures while not on call, periodic updates and sleep mode interactions. This is to be tested in North America by an independent and neutral interoperability lab.

TS 36.306 UE access capabilities – depending on the handset as well as features available on the network, capabilities offered during a period vary. These are typically known at the time of registration, but can change as the mobile transmission is handed off to a different territory where a particular service may / may not be available. Again, this is to be verified through a neutral interoperability lab.

TS 36.508 provides common test environment for UE in the E-UTRA and E-UTRAN environment. This also includes conformance testing. Usually EIA/TIA indicates conformance test labs that are certified by them.

TS 36.521 – 1 Conformance spec. tests for Radio transmission and reception – part 1

TS 36.521 – 2 Conformance tests for Radio transmission and reception – part 2 (ICS)

TS 36.523 series are concerned with conformance to protocols. This is a purely design exercise that must be left to vendors. Protocol conformance can only be verified when open boards where DSP (firmware) changes and ARM processor changes are possible. These also require access to layer 2 and physical layer message sequences. Other than knowing, to a limited extent, how each vendor has implemented the algorithm, no practical purpose will be served. Therefore, testing of protocols is not recommended.

It is anticipated that early entry local and regional based LTE systems will each employ a comprehensive test plan that covers all elements of the test requirements as mentioned. Funding for the initial systems may include federal, state, local and private sector participation. The responsibility for systems testing may be a joint responsibility, depending on the funding sources.

- Test ability to roam off home network within PS allocation - bandwidth and applications.
- Test ability to roam off home network within D Band - bandwidth and applications.
- Test ability to roam off home network within Commercial LTE Network -bandwidth and applications.
- Test preferred networks across all three band functions (PS allocation, D Band, and Commercial LTE Network).
- Test priority and precedence across all three band functions (PS allocation, D Band, and Commercial LTE Network).
- Test bandwidth allocation across three band functions (PS allocation, D Band, and Commercial LTE Network).
- Test bandwidth allocation by application type (some applications having higher precedence).
- Penetration testing of networks by unauthorized users.
- Test notification of unauthorized users on networks.
- Test different types of authorized users on networks across all functions.
- Test multiple security levels across all functions.
- Perform on-going measurements of Network Reliability and Availability at Network Operations Centers, logging measures of performance.
- Perform on-going coverage testing, home and away.
- Test redundancy in infrastructure routing.
- Test vehicle relay usage across all three band functions (PS allocation, D Band, and Commercial LTE Network).
- Test "hardening" parameters for Public Safety End User Equipment.
- Testing - Operations, Administration and Maintenance

D.3 Interoperability Verification

ERIC shall develop an IOT Verification Method with the assistance of following entities in the respective areas:

- Policy – PSST and ERIC PSAC
- Technical – NIST and ERIC TAC

Absence of such verification method may create confusion and could become a hindrance in achieving national interoperability. The verification method will ensure the conformance testing and IOT, of verifying that public safety broadband networks comply with the technology standards adopted for the nationwide network, and are technically capable of achieving interoperability. There will be a higher initial cost of developing the method, and lower sustainability cost, which could be paid out of a national funding mechanism, put in place for the national public safety broadband network. It is anticipated that early builders of local and regional LTE systems will each deploy a comprehensive test plan that covers all elements of the test requirements as outlined in the Order. The funding for the initial systems testing and verification for the early builders may need to be developed with the federal, state, local and private sector participation. The responsibility for systems testing may be a joint responsibility, depending on the funding sources.

E.1 Network Operations, Administration and Maintenance

The Commission seeks comment on the network management, administration/provisioning, and maintenance capabilities of the network to enhance interoperability. The Bay Area reiterates that there are many technical requirements that the network has to meet. Examples include the need for systems to support seamless roaming of devices from one network to another. In addition, device authentication across the network-of-

networks has to be supported, so that system integrity and security is maintained. Further, prioritization and QoS need to be maintained as users move across networks. It is the Bay Area's recommendation that as long as the network -of-networks supports these fundamental requirements, the OA&M capabilities, or the way in which these features are managed throughout the network, do not need to be standardized.

E.2 Reporting on Network Deployment

The Commission asks whether it should require reporting, specifically on planning, funding and deployment of regional networks. The Bay Area feels it is imperative that the Commission stay current with the deployments across the nation, and that quarterly reporting be enforced. The PSST, in conjunction with ERIC, should review and enforce the quarterly reports. These reports should be considered Protected Critical Infrastructure Information (PCII) and not available to the public, as it may expose vulnerabilities that could be exploited.

E.3 Devices

The Commission seeks comment on the use of LTE devices throughout the public safety broadband network. Specifically, it asks about unique bandwidth supports, and the impact on cost. While the Bay Area is not producing the devices, and cannot set costs, we believe that Commission rules should decrease the cost of devices for the public safety community. Further, the Bay Area does not see the need to have bandwidth flexibility if the nationwide system will be operating in the 5+5MHz configuration. The FCC should encourage development of devices that operate across the entire band class 14, as well as devices that support various bands, to enable public safety roaming on to commercial networks. The Bay Area cannot comment on the ability

to add satellite capability to devices, but adds that if a cost effective device that offered reliable and quality performance were available in the market, it would be considered.

E.4 In-building Communications

The Commission seeks comment on standardizing coverage requirements for in-building public safety broadband communications. As discussed in Section A.19, the Bay Area believes that in-building coverage should be designed and accounted for in regional network build-outs as well as the national public safety network. In addition to the FCC requirements, there is also opportunity to enforce the requirement using the National Fire Protection Agency, NFPA, policies developed for in-building coverage. The NFPA published requirements in 2009, in Annex O, which contains specific recommendations for performance, testing and monitoring of the in-building systems. The Commission should consider these recommendations when developing specific needs for in-building systems.

E.5 Deployable Assets

The Commission seeks comment on the use of deployable assets, including COLTs and COWs, in the event of emergency when additional coverage and capacity are required. The Bay Area would wish to utilize such technology as long as it is easily implemented, and does not cause major impact to the systems coverage and capacity. The Bay Area believes that the market demand for this solution will drive the development of these systems, so it may not be necessary for the FCC to incorporate the technology into its rulemaking.

E.6 Operation of Fixed Stations and Complimentary Use of Fixed Broadband Spectrum

The Commission seeks comment on the operation of fixed stations on an ancillary basis. The Bay Area believes that the Commission should allow localities to determine the priorities of users as well as applications, and fixed use stations should be considered an application operating on the network. Further, the Bay Area promotes the use of 4.9 GHz spectrum for fixed use, but realizes there may be specific instances when 700 MHz may be a preferable solution.

E.7 Compliance with the Commission's Environmental Regulations

The Bay Area will comply with the Commission's Environmental Regulations.

E.8 Public Safety Broadband and Next Generation 911

The Commission seeks comment on the integration of the public safety broadband network with Next Generation 911 systems. The Bay Area is extremely interested in the compatibility of the two initiatives, and would like to see requirements defined and translated across both systems. Specifically, the Bay Area sees the need for the instantaneous transmission of video, images and text message from the 911 network to field users. Similarly, location and geospatial data is critical to be maintained across system, so incident location is accurately obtained from the initial call-taking experience. The Bay Area believes that defining these initial requirements is the best way to identify the technical issues that will be introduced and need to be addressed between the systems.

F. Section 337 Eligible Users

The Commission seeks comment on eligible users of the nationwide public safety broadband network. San Francisco and Bay Area jurisdictions have stated in previous Comments to the Commission that any government user with the sole or principal purpose of protecting the safety of life, health or property, or other users required for successful response and recovery event coordination should be allowed as eligible users of the public safety broadband spectrum. For example, we submitted the following in response to the Commission's Request for Comments on Petitions for Waiver to Deploy 700 MHz Public Safety Broadband Networks (Filed October 16, 2009):

> In accordance with [47 U.S.C. Section 337(f) (1)(A)], Bay Area Cities would make the spectrum available only for services that have as their sole or principal purpose protecting the safety of life, health, or property. In addition to police and fire and emergency services, other government provided services would also satisfy this standard, including public hospitals and public health agencies, housing inspectors, agencies that maintain streets and public rights-of-way, agencies that enforce parking and traffic laws, and transportation agencies. In accordance with [47 U.S.C. Section 337(f) (1)(B)], Bay Area Cities would, on a case-by-case basis, authorize non-governmental users to use the spectrum, as long as the use was for the principal purpose of protecting the safety of life, health, or property. For example, while the Bay Area Cities would not allow a privately owned utility to use the spectrum on an everyday basis, [we] would authorize a temporary use by such entities in critical situations such as when restoring interrupted utility service promptly is critical to protecting public safety.
>
> . . .
>
> We agree that the PSBL should be precluded from providing unrestricted spectrum access to non-governmental entities whose principal purpose is not a public safety purpose. However, we cannot agree with extending that rule to prohibit such entities from *ever* using the system, even in public safety emergencies. If a local governmental public safety entity with a spectrum leasing relationship with the PSBL has determined that such use is required to effectively respond to or recover from an emergency, then the requirements of Section 337(f) would be fully satisfied.

> By definition, every disaster is an unplanned incident with unforeseen consequences, which requires a rapid and effective response to a unique series of events as they unfold. Information and support from CII entities will often be a critical component of an effective response and subsequent recovery mission. If the Commission were to establish an inflexible rule banning network access to nongovernmental CII entities, the Commission would place severe limitations on the public safety community's ability to respond quickly and effectively, with potentially disastrous consequences to life, health and property.

For these reasons, we urge the Commission to amend its Rules to allow the most expansive use of public safety broadband spectrum allowed under Section 337.

We also ask that the responsibility for regulating the eligible users on each regional system be delegated to the public safety users of the region. Such limitations may include, but are not limited to, access, priority, consent, fee structure, capacity issues, monitoring and enforcement. We believe that the local public safety agencies have strong incentive to prohibit any impermissible uses of these systems and to enforce such prohibitions. The Commission could still intervene in any case of clear abuse of network usage through conditions placed in license or lease agreements with the system operator. The Bay Area believes that it should be the responsibility of local governance entities, and not the Commission, to determine eligible users of the public safety network according to the region's local needs.

II. CONCLUSION

The Bay Area appreciates the Commission's efforts to further nationwide public safety broadband interoperability. Further the Bay Area's intention is to help provide the Commission with recommendations towards achieving a technical and operational framework for a nationwide public safety broadband network, while supporting early build outs of regional

systems. The Bay Area is committed to a nationwide interoperable broadband public safety network by creating a network-of-networks to provide its first responders with the tools they need to provide safety to the public at all times.

DATED: April 11, 2011

Respectfully submitted,

___/s/ Edwin Lee_____
Mayor Edwin Lee
City and County of San Francisco

____/s/ Jean Quan_____
Mayor Jean Quan
City of Oakland

____/s/ Debora Figone_____
City Manager Debora Figone
City of San Jose