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Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th St., S.W.
Washington, D.C. 20554

Ex Parte Communication

Re: WT Docket No. 06-150; PS Docket No. 06-229; GN Docket No. 09-51; RM Docket No. 11592

Dear Ms. Dortch:

On September 20, 2010, a group calling itself the Coalition for 4G in America (the "Coalition")—consisting of the Rural Cellular Association, the Rural Telecommunications Group, Inc., Sprint Nextel Corporation, T-Mobile USA, Inc., MetroPCS Communications, Inc., Cellular South, Inc., Access Spectrum, LLC, and Xanadoo Company—filed an *ex parte* letter in the above-referenced dockets advocating the establishment of two LTE device bands for all paired frequency bands in the 700 MHz band—one for Lower 700 MHz band and one for the Upper 700 MHz band.[1] In its letter, the Coalition attached a September 10, 2010 white paper by the consulting group Wireless Strategy[2] that attempts to refute the technical and practical objections previously raised by AT&T, Inc. ("AT&T") to abolishing the LTE device bands adopted by the industry standards group, 3rd Generation Partnership Project ("3GPP"), in favor of one or more Commission mandated LTE device bands requiring interoperability throughout the 700 MHz band. AT&T submits this written *ex parte* letter to point out the deficiencies in the September 2010 White Paper and the reasons why the Coalition's proposal remains a flawed plan.

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[1] *See* Letter from Lawrence R. Krevor, Sprint Nextel Corporation, Thomas J. Sugrue, T-Mobile USA, Inc., Caressa D. Bennet, Rural Telcommunications Group, Inc., Steven K. Berry, Rural Cellular Association, Mark A. Stachiw, MetroPCS Communications, Inc., Eric B. Graham, Cellular South, Inc., Michael I. Gottdenker, Access Spectrum, LLC, and Marshall W. Pagon, Xanadoo Company, to Marlene H. Dortch, Federal Communications Commission, WT Docket No. 06-150; PS Docket No. 06-229; GN Docket No. 09-51; RM Docket No. 11592 (Sept. 20, 2010).

[2] Wireless Strategy, LLC, *Lower 700 MHz Interference Management* (Sept. 10, 2010) ("September 2010 White Paper").

The September 2010 White Paper presents nothing new to demonstrate why overriding 3GPP in favor of two Commission mandated 700 MHz LTE device bands is in the public interest or resolves the concerns that AT&T has raised. Instead, the Coalition merely continues the claim made in a Wireless Strategy white paper submitted with a May 10, 2010 *ex parte* letter signed by the members of the Coalition,[3] that site placement would solve all interference concerns. If the interference issues could be resolved as easily as placing a single LTE base station near the high-powered base stations, as stated in the September 2010 White Paper, then there would be no outstanding interference issues. Instead, 3GPP has not found a workable solution to the interference issues and is still meeting, as recently as this October 11-15, 2010, to work toward developing some resolution.

In its June 3, 2010 *ex parte* letter and other submissions in RM Docket No. 11592, AT&T has explained in detail the process by which 3GPP adopted the 700 MHz LTE device standards and specifically the events leading to the adoption of Bands 13 and 17.[4] AT&T refers the Commission to those submissions. In those submissions, AT&T also provided the Commission with a number of practical, policy, and technical implications that will plague any effort to require all 700 MHz capable devices to support all 700 MHz blocks. The Coalition and its September 2010 White Paper fail to adequately refute these concerns. First, the Coalition does not refute the harms to the public that its proposal would entail, including delaying the deployment of 4G LTE networks and devices. Second, the Coalition does not refute the interference issues associated with the Upper 700 MHz band. Third, the Coalition agrees that potential interference exists within the Lower 700 MHz band, but wrongly speculates that cell site co-siting can resolve all interference issues. The Coalition evidently expects the Commission to accept these deficiencies and reconstruct the LTE device standards merely because doing so is more advantageous for the competitive positions of Coalition members and other A-block licensees. Such action to override industry developed technical standards in favor of rules intended to benefit Lower 700 MHz A-block licensees at the expense of all other 700 MHz licensees, public safety, and the public would be virtually unprecedented. The Commission should not follow the Coalition's lead and should instead allow the 3GPP standards and the marketplace to determine the evolution of LTE deployments.

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[3] *See* Letter from Lawrence R. Krevor, Sprint Nextel Corporation, Thomas J. Sugrue, T-Mobile USA, Inc., Caressa D. Bennet, Rural Telcommunications Group, Inc., Steven K. Berry, Rural Cellular Association, Mark A. Stachiw, MetroPCS Communications, Inc., Eric B. Graham, Cellular South, Inc., Craig Viehweg, Triad 700, LLC, Grant B. Spellmeyer, United States Cellular Corporation, Michael I. Gottdenker, Access Spectrum, LLC, and Marshall W. Pagon, Xanadoo Company, to Marlene H. Dortch, Federal Communications Commission, WT Docket No. 06-150; PS Docket No. 06-229; GN Docket No. 09-51; RM Docket No. 11592 (May 10, 2010).

[4] Letter from Joseph P. Marx, AT&T, to Marlene H. Dortch, Federal Communications Commission, WT Docket No. 06-150; PS Docket No. 06-229; GN Docket No. 09-51; RM Docket No. 11592 (June 3, 2010) ("AT&T June 2010 *Ex Parte* Letter"); Comments of AT&T Inc., RM No. 11592 (filed March 31, 2010); Reply Comments of AT&T Inc., RM No. 11592 (filed April 30, 2010).

The Coalition Proposal Would Delay LTE 4G Deployment and Negatively Impact Public Safety. Since the adoption of the LTE device standards by 3GPP, the wireless industry has been designing networks and devices to these standards. The Coalition now asks the Commission to bring this 4G design process to a screeching halt, and in a virtually unprecedented move, insert itself into the standards-setting process at the 11th hour, and pre-empt the 3GPP band designations in favor of a more rigid band plan designed to boost the competitive prospects of Coalition members and certain Lower 700 MHz A-block licensees. Even if changing the 700 MHz band plans were legally possible, which it is not, adopting the Coalition's proposal would introduce a multitude of corresponding harms to consumers, carriers, and public safety,[5] including the following:

4G Network Deployment and Device Availability Would be Significantly Delayed. AT&T and Verizon, and possibly other wireless carriers, are testing and trialing devices and networks that will use Bands 17 and 13, respectively, based on band designations already adopted in 3GPP. The Coalition plan, if adopted, would strand those investments and force carriers and equipment manufacturers working on LTE deployment to start over. Switching to new LTE device bands would force the development of new standards, followed by additional design, testing, and trials of networks and devices, all of which would delay 4G roll-out for years.[6] Even

[5] *See, e.g.*, Comments of Verizon Wireless, RM 11592, at ii (filed March 31, 2010) ("Verizon Comments") ("Even beginning the rulemaking the Alliance seeks, let alone adopting the rules it requests, would impede the deployment of broadband mobile devices for 4G services and impair the delivery of the benefits of 4G technology for consumers—all in direct conflict with Congress's and the Commission's objectives of promoting advanced broadband services."); Comments of Motorola, Inc., RM11592, at 1 (filed March 31, 2010) ("Motorola Comments") ("Motorola urges the Commission to dismiss the petition as the requested relief would unnecessarily delay the deployment of 700 MHz mobile broadband devices, including those designed to operate on public safety broadband spectrum."); Comments of Qualcomm Incorporated, RM 11592, at 1-2 (filed March 31, 2010) ("Qualcomm Comments") ("[A] grant of the relief requested in the Petition would: (1) delay any mobile broadband deployments at 700 MHz for an unspecified period of time; (2) drive up the costs of devices supporting the Lower and Upper 700 MHz bands by an unspecified amount; (3) imperil Qualcomm's ongoing development of chipsets for the Lower and Upper 700 MHz bands; and, above all, (4) unnecessarily deprive American consumers of new mobile broadband networks and devices.").

[6] *See, e.g.*, Verizon Comments, at ii ("There would be no better way to frustrate and delay the development of wireless broadband, and drive up costs of devices to consumers, than by taking up the Alliance's Petition."); Comments of AT&T Inc., RM No. 11592, at 10 (filed March 31, 2010) ("AT&T, Verizon and other 700 MHz licensees have been diligently developing and initiating their business plans for 700 MHz LTE network deployment and working with manufacturers to develop handsets for those networks that are compatible with each carrier's existing spectrum holdings and business plans. Injecting an artificial requirement that 700 MHz

Coalition member Cellular South estimates an 18-24 month period to design and produce new devices that operate on all 700 MHz frequencies.[7] Moreover, delaying LTE deployment would frustrate one of the goals of the National Broadband Plan: "The United States should lead the world in mobile innovation, with the fastest and most extensive wireless networks of any nation."[8] Wireless providers are on the cusp of advancing in that direction, as planned LTE deployments mean that "the majority of Americans may be covered by very high-speed mobile broadband services by the end of 2011."[9] The Coalition proposal should not be allowed to undo this progress.

Lack of Backward Compatible 4G Devices Would Slow Down 4G Adoption. Modern chipsets can support only two bands under 1 GHz for broadband. Forcing carriers to incorporate two 4G bands proposed by the Coalition (a Lower 700 MHz band and an Upper 700 MHz band) into all 700 MHz devices would prevent backward-compatibility with legacy mobile broadband networks.[10] This would limit the use of those devices to areas where LTE service has been deployed. Given that it will take years to achieve ubiquitous LTE network coverage, consumers would be reluctant to purchase LTE devices that work only in a few places.[11] The only way to address this backward compatibility problem is to add additional chipsets to devices, which would increase device costs, size, negatively impact battery life, and leave less room for components that support other services which consumers actually desire and would use (*e.g.*, GPS, Bluetooth, graphics cards, and Wi-Fi).[12]

Increased Network Costs and Prices for Consumers for 4G services. The September 2010 White Paper advocates that 700 MHz licensees resolve all interference concerns by building

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licensees deploy only handsets that operate in all paired 700 MHz bands will squander all of these efforts").

[7] Comments of Cellular South, Inc., RM 11592, at 5 (filed March 31, 2010).

[8] Federal Communications Commission, *Connecting America: The National Broadband Plan*, Goal 2, at 9 (rel. March 16, 2010).

[9] Jaikishan Rajaraman, *U.S. at the Forefront of a Global Shift to LTE*, Wireless Week (Oct. 28, 2010), *available at* http://www.wirelessweek.com/Articles/2010/10/US-Forefront-Global-Shift-LTE/.

[10] *See, e.g.*, Verizon Comments at 10-11; Qualcomm Comments at 4-5; Motorola Comments at 6-9.

[11] *See, e.g.*, Verizon Comments at 10-11; Qualcomm Comments at 4-5; Motorola Comments at 6-9.

[12] *See, e.g.*, Verizon Comments at 10-11; Qualcomm Comments at 4-5; Motorola Comments at 6-9.

more cell sites near high powered base stations that support Channel 51, D-block, and/or E-block operations. Aside from the issue of the impracticality of building enough cell sites, doing so would further raise the cost of providing 4G service, which would eventually be passed on to consumers. Further, 700 MHz licensees would be forced to build base stations in ways that seek to minimize the harms of the Coalition's LTE device band plan, rather than using their best engineering judgment to maximize the efficiency and quality of service of the 4G network.

Reduced Ubiquity of Public Safety Coverage and Increased Cost of Public Safety Devices. All of these problems – delayed deployment, lack of backwards compatibility, increased cost, costlier and less feature-rich 4G devices – would have significant impacts on public safety and frustrate the Commission's goals for the deployment of nationwide, interoperable public safety broadband networks. Further, public safety 700 MHz devices, like commercial devices, would operate only where 700 MHz LTE networks are deployed. This would severely limit the use of public safety LTE devices, which will still need to rely on commercial wireless networks for many years to maintain ubiquitous coverage, as LTE networks, including public safety networks, will have substantial coverage gaps. Public safety devices would require additional chipsets to overcome this limitation, increasing the cost of those devices.

These public interest harms – none of which are addressed by the September 2010 White Paper – provide more than enough reason to reject the Coalition's proposal.

The September 2010 White Paper Does Not Resolve the Lower 700 MHz Interference Concerns. In response to the proposal to mandate full 700 MHz interoperability among 700 MHz capable devices, AT&T explained that such an approach would require Lower 700 MHz B-block and C-block licensees to contend with significant interference from all directions. Wireless Strategy does not disagree that supporting Band 12 could introduce interference concerns for Lower 700 MHz band licensees. Neither has it disagreed with the premise that utilizing devices that support Band 13 and Band 17 would solve those interference concerns. Rather, Wireless Strategy, on behalf of the 4G Coalition members, continues to claim, as it did in a May 6, 2010 white paper—that "commonplace engineering techniques" (i.e. building more wireless facilities closer to high power stations) should be used exclusively to address the interference problems.[13] This position reflects a theoretical view of interference issues, not a real world understanding of operating a wireless network.

Though AT&T engages in significant coordination and will continue to do so, including coordination to minimize interference concerns, it is inaccurate to suggest that coordination alone is sufficient to address the unique and quite substantial interference concerns for Band 12. The interference issues here are completely unprecedented— licensed mobile spectrum

[13] *See, e.g., September 2010 White Paper*, at 3 ("The analyses contained herein demonstrate how the 3GPP specifications, in combination with commonplace engineering techniques, are more than sufficient to eliminate the lower 700 MHz interference concerns while supporting the Band 12 filtering approach in the LTE devices.").

sandwiched between multiple high-powered broadcasts. Siting a new base station to minimize interference from one high-power source may well increase interference in other areas. This could be particularly challenging in many areas, particularly in more urban environments where there may be a greater number of D-block and E-block transmitters. The attached map showing the number of MediaFlo sites and Channel 51 transmitter in the San Francisco area demonstrates the challenges associated with juggling the placement of LTE sites, especially because, as discussed below, multiple additional LTE sites will likely be needed near each high power site to resolve the interference issue through site placement as proposed by Wireless Strategy. In addition, new high-powered sites could be installed and put into service at any time, forcing the other adjacent operators to repeatedly re-engineer their network.

Carriers may also face real and significant limitations on where they can place base stations. There are a very limited number of locations that are suitable for a base station, especially in urban areas like New York and Chicago. In many instances, locations are not suitable for a base station because of community issues (*e.g.*, a residential neighborhood, community resistance). Even where potential sites exist, local authorities often block siting, or delay the siting approval for months or years. While locating or relocating a base station may sound like a simple task, it actually is a multi-year exercise that would not quickly or easily reduce interference problems from high power broadcasts.

Wireless Strategy ignores the fact that the next-generation 4G networks will require tens of thousands of base stations to provide national coverage, and that there are many Channel 51 and D-block and E-block transmitters already in place or planned, with many more likely as those services continue to develop and expand. Coordinating base station placement among so many providers and so many base stations would be a logistical nightmare even in a static environment. But in the real world, where providers are constantly adding and re-locating base stations to improve service and to provide additional services, such coordination is a practical impossibility. New or relocated base stations would trigger a series of other necessary new base stations or re-locations to avoid interference.

Wireless Strategy fails to consider the impact on *customers* of its proposed coordination approach. Constantly moving and adjusting base stations and seeking new siting approvals is an extremely expensive and time consuming process. Forcing mobile providers to do so would divert money away from investment in innovation and expansion and could result in higher prices. Further, sole reliance on coordination would result in sub-optimal base station siting, tilt and orientation that will reduce coverage and quality of service. It would also create substantial barriers to entry and expansion, because new providers would not be able simply to locate and position their receivers and transmitters in the most economical manner, but would instead have to find the gaps left in the existing wireless landscape where their new equipment could operate with minimum interference. All of this would harm consumers through less coverage, lower quality services (more blocked/dropped transmissions and lower throughput), less investment in innovation, and potentially higher prices. There is simply not adequate justification to force providers to rely on coordination to address interference concerns with *all* of their spectrum

neighbors where there are feasible alternatives, such as using Band 17 to reduce such interference.

The September 2010 White Paper argues that only one base station located near a high power source will resolve interference issues. However, that is merely speculation. In fact, it would likely take multiple sites to increase the wireless signal strength throughout the area covered by the high power station to minimize any interference issues. The Lower 700 MHz D-block and E-block base stations and Channel 51 base stations are authorized to transmit at much higher power levels than 4G providers in Band 12. Therefore, even with 4G base stations located directly at the D-block and E-block base stations, the 4G signal will become weak relative to the high power D-block and E-block transmissions well within the 4G transmission radius. For example, a D-block or E-block base station with a cell radius of about 15 kilometers will still over power the signal from a LTE base station beyond the LTE station's cell radius of 8 kilometers, necessitating the placement of another base station to avoid interference. Replicate this interference around the circumference of a high power base station and it becomes evident that multiple cell sites will typically be needed to address interference concerns.

Other than its unrealistic site coordination proposal, the September 2010 White Paper fails to resolve the interference concerns that AT&T raises to the Coalition plan to mandate 700 MHz device interoperability. For example, AT&T has explained that Channel 51 receivers will be susceptible to adjacent channel interference as well as out of band emissions ("OOBE") from Band 12 devices operating in adjacent 700 MHz A-block frequencies. Similar concerns about adjacent channel interference to TV channels led the Commission to adopt lower power limits for adjacent channel operations in the TV white spaces.[14] In addition, Samsung recently filed a paper with 3GPP addressing OOBE issues that remain a concern.[15] Motorola has also explained that concern about OOBE to Channel 51 was one of the reasons for the development of Band 17.[16] Simply put, Band 17 devices provide more OOBE attenuation than Band 12 devices.[17]

Wireless Strategy also dismisses the interference that can arise from intermodulation of Channel 51, D-block, and E-block transmissions with a Band 12 device's transmitted signal, again arguing that base station placement is the solution. In addition to the difficulties of site placement, the intermodulation which can adversely affect the device's ability to receive its intended signal, resulting in blocked or dropped transmissions, battery life issues, and creating further interference potential to Channel 51 receivers. Wireless Strategy does not dispute the

[14] See 47 C.F.R. §15.709(a)(2).

[15] *See* Samsung, *Further Analysis of Band 12 UE Interference Issues*, 3GPP TSG RAN WG4 Ad-Hoc Meeting (Sept. 29, 2010).

[16] Comments of Motorola, RM Docket 11592, at 2 (filed Feb. 8, 2010).

[17] The September 2010 White Paper also fails to address OOBE interference from Channel 51 transmissions to Band 12 base stations, which will require Band 12 devices to operate at higher power and lower throughput (and may in some instances result in blocked or dropped calls).

intermodulation that can occur with a 10 MHz LTE system, but argues that intermodulation cannot occur with 5 MHz LTE systems. This is inconsistent with Fujitsu's findings recently submitted to 3GPP.[18] Wireless Strategy also attributes significance to its own statement that "AT&T does not plan to coordinate their LTE base station installations with the adjacent lower D-block operators" [19] and, based upon its statement, concludes that "AT&T devices must be capable of adequate operation under any potential reverse PA intermodulation between the lower B and D channels including cases where the LTE device is transmitting near its maximum power when close to a D block broadcast tower."[20] The significance of this last statement should not be lost. Band 17 devices will not be as susceptible to intermodulation as Band 12 devices because the Band 17 filter provides greater attenuation than a Band 12 filter. This is exactly why Band 17 was developed—to minimize interference from adjacent high powered bands.

The September 2010 White Paper Does Not Address the Upper 700 MHz Concerns. In its submissions in RM Docket 11592, AT&T explains that adopting the LTE device band plan proposed by the 700 MHz A-block licensee would cause the reduction of the duplex gap in the Upper 700 MHz band, cause OOBE within the Upper 700 MHz public safety narrowband spectrum, and precludes GPS in devices supporting the Upper 700 MHz band because of second harmonic.[21] The September 2010 White Paper presents no solutions to resolve those interference problems.

The Coalitions Proposal Would Be Unlawful. The Coalition's proposal for the Commission to ignore the industry standards for LTE networks and devices in favor of a set of new Commission mandated technical standards would be unlawful. AT&T refers the Commission to the detailed explanation of the legal infirmities in the Coalition proposal in AT&T's prior *ex parte* submission in these dockets.[22]

The September 2010 White Paper is yet another attempt by members of the Coalition to stall AT&T's and Verizon's 4G rollout plans. (Sprint's and T-Mobile's inclusion in the Coalition is particularly telling because they do not (by their own choice) hold 700 MHz licenses and therefore have no other apparent stake in this issue other than to delay their competitors' 4G roll out plans.) The Commission should reject these efforts to delay 4G broadband rollout. The A-block licensees knew, or reasonably should have known, for many years—prior to the 700 MHz auctions—about the 700 MHz interference issues that eventually led 3GPP to adopt LTE

[18] Fujitsu, Bands 12 & 17 IMD Concerns, 3GPP TSG-RAN4 AH#10-04, at 5 (Oct. 2010).

[19] Wireless Strategy mischaracterizes AT&T's position to find support for this statement. In fact, as AT&T has pointed out, and Wireless Strategy conveniently ignores, AT&T will continue to engage in base station coordination, but coordination cannot resolve all (or even the majority of) interference concerns, especially considering the challenges associated with base station siting and the need to simultaneously coordinate LTE, Channel 51, D block, and E block sites.

[21] *See* AT&T June 2010 *Ex Parte* Letter.

[22] *Id.*

700 MHz device Bands 13 and 17, yet they raise objections to the 3GPP device bands only now, as AT&T and Verizon finalize plans to roll out 4G networks. The Commission emphasized, as early as 2002, that it expected Lower 700 MHz A-block bidders to "take into account" the A-block challenges and "develop their business plans, services, and facilities accordingly."[23] As a result, Lower 700 MHz A-block licenses brought far lower prices in the auction than other 700 MHz licenses that were not adjacent to high power broadcast licenses. Any difficulties or higher costs that A-block licensees encounter in deploying service are fully reflected in the sharply lower prices they paid to obtain the A-block licenses.

The Commission should avoid delaying the deployment of 4G LTE service, as proposed by the members of the Coalition and certain Lower 700 MHz A-block licensees. The solution proposed by the Coalition—to create two Commission mandated 700 MHz band LTE device bands—would strand the investment already made by carriers and manufacturers preparing for LTE deployment, which would be forced to start from scratch designing and planning their LTE devices and networks. LTE development would stop in its tracks and be delayed for approximately two years, frustrating the goal of the National Broadband Plan for the United States to be the leader in mobile broadband deployment.

Further, the Coalition plan would introduce the potential for interference from multiple sources to commercial operations in the Lower 700 MHz and Upper 700 MHz blocks and to Channel 51 receivers. The Coalition does not dispute the risk of interference or that Bands 13 and 17 solve those interference concerns, but instead proposes a solution whereby 700 MHz licensees must build new LTE sites wherever and whenever an interference problem is discovered. Not only is such a solution extremely costly, it is also impractical and demonstrates a lack of understanding of real world scenarios. It also overlooks the fact that industry groups have already developed the best solution to the interference issue—allow the other commercial 700 MHz licensees to incorporate devices utilizing LTE Bands 13 and 17 into their networks.

Under these circumstances, it would be arbitrary to promulgate post-auction regulations that are specifically designed to reduce the opportunities and value associated with the B-block and C-block licenses in an effort to increase the value and opportunities associated with the A-block licenses. It would be an unprecedented Commission intrusion into industry technical standards at the 11th hour merely to favor one group of 700MHz licensees over all other 700 MHz licensees. Other 700 MHz licensees, consumers and public safety[24] should not have to bear the extraordinary expense of eliminating interference associated with supporting the A-block when another more sensible solution exists—use the LTE Bands adopted by 3GPP.

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[23] Report and Order, *Reallocation and Service Rules for the 698-746 MHz Spectrum Band* (*Television Channels 52-59)*, 17 FCC Rcd 1022, ¶ 23 (2002).

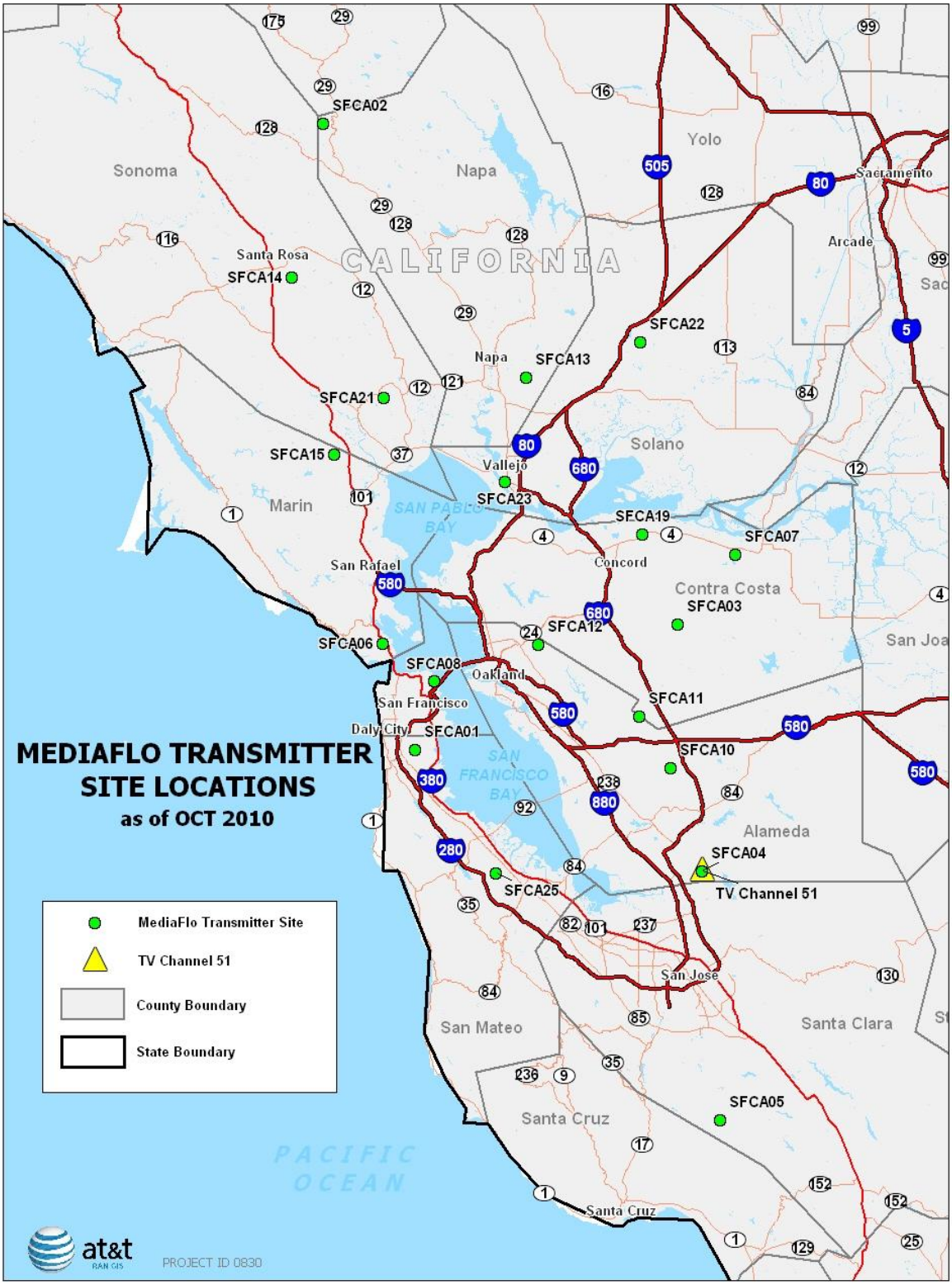
[24] Notably, the National Public Safety Communications Council ("NPSTC") has made clear that public safety requires support for only Band 14 and that operations in the other 700 MHz blocks are to be considered optional. Report and Recommendations, NPSTC 700 MHz Public Safety Broadband Task Force, at 10-13 (Sep. 4, 2009).

Pursuant to Section 1.1206 of the Commission's rules, an electronic copy of this letter is being filed for inclusion in the above-referenced docket.

Respectfully submitted,

/s/ Joseph P. Marx

Attachment


MEDIAFLO TRANSMITTER SITE LOCATIONS
as of OCT 2010
MediaFlo Transmitter Site
TV Channel 51
County Boundary
State Boundary
SFCA01
SFCA02
SFCA03
SFCA04
SFCA05
SFCA06
SFCA07
SFCA08
SFCA10
SFCA11
SFCA12
SFCA13
SFCA14
SFCA15
SFCA19
SFCA21
SFCA22
SFCA23
SFCA25
TV Channel 51
Sonoma
Napa
Yolo
Sacramento
Arcade
Santa Rosa
Marin
Solano
Vallejo
Concord
Contra Costa
San Rafael
San Francisco
Oakland
Daly City
Alameda
San Jose
San Mateo
Santa Clara
Santa Cruz
CALIFORNIA
SAN PABLO BAY
SAN FRANCISCO BAY
PACIFIC OCEAN
at&t
PROJECT ID 0830