

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

In the Matter of)
)
Commission Seeks Comment on Licensing Models) GN Docket No. 12-354
and Technical Requirements in the)
3550-3650 MHz Band)

To: The Commission

**COMMENTS OF
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The undersigned nonprofit groups – the Open Technology Institute at the New America Foundation, Public Knowledge, Common Cause and the Institute for Local Self-Reliance (hereinafter “Public Interest Spectrum Coalition” or “PISC”) – are pleased to submit these Reply Comments in response to the *Further Notice of Proposed Rulemaking* (“FNPRM”) released on April 23, 2014 in the above-captioned proceeding.¹

I. INTRODUCTION AND SUMMARY

The undersigned members of the Public Interest Spectrum Coalition (hereinafter “PISC”), applaud the Commission for its innovative and balanced proposal to unlock the tremendous potential of unused spectrum in the 3.5 GHz band. A Citizen’s Broadband Radio Service (“CBRS”) based on the dynamic three-tier access framework recommended by the President’s Council of Advisors on Science and Technology (PCAST) is potentially a landmark in the Commission’s progress away from static “command and control” licensing rules and toward more flexible and spectrum-efficient approaches that harness the full potential of the nation’s spectrum resource. We applaud the Commission’s effort to convert this grossly underutilized spectrum into an intensively-used, small-cell band in a manner that not only protects military and other incumbent systems from interference, but also builds a foundation for more extensive private sector sharing of underutilized bands with an automated governing mechanism (a “Spectrum Access System”).

¹ See *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Further Notice of Proposed Rulemaking, GN Docket No. 12-354, FCC 14-49 (rel. Apr. 23, 2014) (“FNPRM”).

The comments of most parties continue to reflect a broad consensus in favor of a unified band plan implementing the three-tier framework and Spectrum Access System (“SAS”) proposed by the Commission in the *FNPRM*. The record also demonstrates strong support among a diverse range of industry commenters for the Commission’s proposal to reserve for General Authorized Access (“GAA”) use a minimum 50 percent of the available spectrum in every license area nationwide and to authorize the SAS to coordinate opportunistic access to unused Priority Access (“PA”) spectrum capacity across the entire 3550-3700 MHz band. A “use it or share it” policy is the closest thing to a spectrum efficiency “free lunch.” The default position for the SAS should be to assign the unused portion of a census tract to the pool of available GAA spectrum on a temporary basis.

PISC strongly opposes the two-tier “Transitional Framework” that Verizon and AT&T propose as an alternative to rapid implementation of the Commission’s proposed three-tier framework. Verizon’s proposed “Transitional Framework” has no credible rationale and is clearly designed to ensure that GAA use of the band either never happens, or is isolated in a separate “unlicensed” segment of the band, using devices that Verizon previously argued should be *prohibited* from being interoperable with Priority Access devices or from operating even on unassigned PA spectrum.

Sadly, the comments filed by Verizon, AT&T and their associated equipment and chip vendors (Qualcomm, et al.) remain remarkably consistent with the last 25 years of filing on wireless technologies. Since the dawn of the wireless age, Ma Bell (and, subsequently, the Baby Bells) have fought the evolution of innovative and competitive wireless technologies. In the 1980s, the wireline incumbents insisted that the FCC should limit the number of initial cellular licenses to two, with one in every market going to the incumbent to 'ensure' development of the

new technology by giving it to the expert incumbent phone company. At every evolution in the wireless market – from the decision to implement auctions in 1994 to the decision to create the TV white spaces in 2008 – the incumbent cellular interests have consistently made the same argument: trust the incumbent providers and their business model rather than 'risky' new technologies or 'unproven' new entrants.

In this proceeding the incumbent interests have taken their protectionist policy arguments to new heights of absurdity. Rather than continue the straightforward technical evolution of spectrum sharing technologies as identified by the Commission, PCAST, Internet companies and leading independent technical experts, AT&T and Verizon urge the Commission to delay the implementation of dynamic small cell sharing and instead adopt an untried approach whose sole 'virtue' is that it would undermine the evolution of spectrum sharing technologies and the growth of competitors incumbents fear would disrupt their current business models.

If the last 25 years of wireless policy have taught us anything, it is that the arguments of incumbents provide an impeccable compass for the Commission as it seeks to chart a path to innovation. Whatever the incumbents urge, do the opposite. Where the FCC has listened to the incumbent chorus demanding set asides and privileges to 'ensure' the 'productive use and development' of spectrum – such as when the FCC adopted the AT&T proposal to create a wireless duopoly and award one free license to every wireline incumbent – innovation and competition have suffered. When the FCC has ignored these pleas for special treatment – such as when the FCC rejected the demands of virtually the same set of commenters to license and auction the TV white spaces – the American people have reaped the rich rewards that come from new technologies and new entrants.

History also tells us that the incumbents themselves will benefit from the technologies they resist today. As PK, OTI and others predicted when defending expansion of shared spectrum technologies over the last 12 years, users of licensed spectrum have become active users and multi-billion dollar beneficiaries of the unlicensed spectrum technologies they once sought to undermine and cripple, but which now substitute for expensive carrier infrastructure that would otherwise be needed to carry surging data traffic. Now these very same companies and trade associations try to undermine and cripple deployment of the next generation of small cell, shared spectrum technology in the 3.5 GHz band. The Commission should reject their transparent attempt to thwart the forward-looking efficiencies, innovation and consumer benefits likely to result from the Commission's proposed Citizen's Broadband Radio Service.

Concerning Contained Access Users ("CAUs"), the record demonstrates uniform opposition to authorizing a CAU to reserve exclusive use of GAA spectrum. Although our groups are sympathetic to meeting the perceived needs of certain "mission critical" public safety and other public entities for indoor quality of service, PISC suggests that exclusive-use reservations for CAUs should properly be Priority Access Licenses that do not diminish the GAA spectrum available to the public at large.

With respect to exclusion zones to protect incumbent naval radars, PISC agrees with the widespread consensus among commenters that the Commission must act as an *independent* regulatory agency and reject large and static "exclusion zones" that are not absolutely necessary to protect Federal incumbent operations from harmful interference, as well as any claims that private sector PA or GAA devices must be involuntarily protected from Federal incumbent transmissions. Static geographic exclusion zones are neither necessary nor spectrum efficient,

and PISC urges the Commission to work with the White House and the NTIA to convert the flawed “Fast Track” exclusion zones into *de minimis* Coordination Zones.

Concerning PA licensing areas, although PISC agrees that census tracts could represent a workable “middle ground” compromise, PISC believes that the SAS can define PA licensing areas that better match the operational and protection contours of a wide variety of potential users by using a grid of standardized but small geographic “pixels,” as the Commission describes as an alternative approach. Our groups agree that fine-grained pixels can be combined to approximate the operational and protection contours of more heterogenous system deployments.

PISC strongly opposes package bidding for auctions in this band. Package bidding could completely negate the benefits of small licensing areas – a problem that would be exacerbated by the Commission’s proposal to allow entities to acquire as much as 30 MHz of PAL spectrum and to lock it up for five years. For similar reasons, PISC continues to recommend that when mutual exclusivity exists, a single entity (or any related entities) should be eligible to license no more than 20 MHz at any one time in a given license area.

Concerning the role of the SAS, PISC joins the strong support among commenters in favor of the Commission’s proposal to authorize the SAS to dynamically assign channels to PA licensees and variable amounts of bandwidth to GAA users, depending on demand and other factors. PISC strongly supports the Commission’s proposal to ensure that the SASs retain information on all operations within the 3.5 GHz band, including all the data pertaining to Section 96.36, and to make that information publicly available. Our groups believe it is critical for the credibility and proper functioning of the CBRS that the informational inputs and outputs of each SAS be completely transparent to the public. PISC also agrees with commenters seeking

to clarify that consumers are not required to register end-user devices with the SAS if the devices are controlled by base stations or networks that do register and interact with the SAS.

With respect to technical rules, PISC joins the many commenters supporting the Commission's effort to adopt common technical rules for PAL and GAA devices that promote both dynamic frequency assignment and a mass market ecosystem of devices that can operate on either licensed (PAL) or unlicensed (GAA) spectrum. PISC urges the Commission to adopt higher power levels in rural areas that are consistent with the existing 3650-3700 MHz Part 90 limits. If the Commission concludes this will preempt small cell GAA use in rural areas, our groups believe it would be preferable to apply the reduced end-user power levels to a portion of the GAA spectrum in rural areas, rather than render the entire 3550-3650 MHz band less potent for fixed wireless broadband services in less densely populated areas.

Finally, PISC is pleased to agree with the vast majority of comments filed in support of the Commission's proposal to extend the proposed CBRS regulatory regime to the 3650-3700 MHz band, subject to a fair but finite transition period for incumbent providers who have deployed pursuant to the current Part 90 "light licensing" rules. To protect the investments made in reliance on the current Part 90 rules, as well as consumers relying on WISP services, PISC suggests that the five-year transition period could be extended to commence on the date that the first SAS is certified by the Commission for nationwide operation.

II. PISC STRONGLY SUPPORTS THE PROPOSED THREE-TIER ACCESS FRAMEWORK MANAGED BY ONE OR MORE THIRD PARTY SPECTRUM ACCESS SYSTEMS AND OPPOSES ANY 'TRANSITIONAL FRAMEWORK' THAT DIVIDES THE BAND

PISC was pleased to see that the comments continue to reflect a broad consensus in favor of a unified band plan implementing the three-tier framework and Spectrum Access System ("SAS") proposed by the Commission in the *FNPRM* and consistent with the 2012

recommendations of the President’s Council of Advisors on Science and Technology (PCAST).² The record also demonstrates strong support among a diverse range of industry commenters for the Commission’s proposal to extend the Citizen Broadband Radio Service rules to include 3650-3700 MHz, to reserve for General Authorized Access (“GAA”) use a minimum 50 percent of the available spectrum in every license area nationwide, and to authorize the SAS to coordinate opportunistic access to unused Priority Access (“PA”) spectrum capacity throughout the 3550-37000 MHz band. Accordingly, PISC strongly opposes the two-tier “Transitional Framework” that Verizon and AT&T propose as an alternative to rapid implementation of the Commission’s proposed three-tier access framework.

A. There Continues to be Widespread Support for the Proposed CBRS Based on a Unified Band Plan with Three Tiers of Access and Interference Protection Enforced by a Spectrum Access System

PISC strongly supports the Commission’s proposal to implement a three-tier access framework that ensures a robust amount of spectrum for GAA on a nationwide basis. PISC was pleased to see that the comments filed in response to the *FNPRM* strongly support the Commission’s proposed rules and the essential elements of the proposed three-tier Citizen’s Broadband Radio Service (“CBRS”). Our groups agree that the essential elements of the proposed Citizens’ Broadband Service include a three-tier access framework to a unified band managed by a neutral SAS, a minimum reservation of at least 50 percent of the available spectrum for GAA use in every market nationwide, and opportunistic access to unassigned and unused Priority Access spectrum on a use-it-or-share-it basis, subject to protecting incumbents and PA licensees. We concur that these essential elements will not only facilitate innovation and

² President’s Council of Advisors on Science and Technology, *Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth*, Executive Office of the President (rel. July 20, 2012) (“PCAST Report”)

intensive use of the 3.5 GHz band by a very diverse array of businesses and individuals, but also lay a historic foundation for the dynamic sharing of unused capacity on additional Federal and other bands in the future.

We agree with Motorola Mobility and other parties that a three-tier access system managed by one or more third-party database managers (a “SAS”) strikes the right balance between protecting incumbent operations and facilitating a diverse range of private sector small cell deployments.³ NCTA, WISPA, Google, Microsoft and a diverse range of other parties share the view of our groups that a robust GAA tier is particularly important for promoting spectrum efficiency, mobile device traffic offload and future wireless innovation more generally.⁴

B. The Commission Should Reject the ‘Transitional Framework’ Proposal by the Two Dominant Mobile Carriers

PISC strongly opposes the two-tier “Transitional Framework” that Verizon and AT&T propose as an alternative to rapid implementation of the Commission’s proposed three-tier access framework.⁵ Verizon’s proposed “Transitional Framework” is clearly designed to ensure that GAA use of the band either never happens, or is isolated in a separate “unlicensed” segment of the band, using devices the carrier previously argued should be *prohibited* from being

³ See, e.g., Comments of Motorola Mobility, GN Docket No. 12-354 (Jul. 14, 2014) (“Motorola Mobility Comments”), at 4 (“the proposed framework strikes the proper balance of . . . PAL and . . . GAA user needs by allowing for maximum flexibility and promoting important Commission objectives.”); Comments of Microsoft, GN Docket No. 12-354 (Jul. 14, 2014) (“Microsoft Comments”), at 1 (“We support the Commission’s framework of three tiers of access . . . managed by a dynamic Spectrum Access System”).

⁴ See, e.g., Comments the National Cable and Telecommunications Association, GN Docket No. 12-354 (Jul. 14, 2014) (“NCTA Comments”), at 6: “NCTA shares the Commission’s view that small cell networks using the 3.5 GHz band – which will have characteristics similar to Wi-Fi access points – can be an important resource to help ‘address wireless coverage and capacity issues’ . . .”.

⁵ Comments of Verizon and Verizon Wireless, GN Docket No. 12-354 (Jul. 14, 2014) (“Verizon Comments”), at 11-13; Comments of AT&T, GN Docket No. 12-354 (Jul. 14, 2014) (“AT&T Comments”), at 20-24. *Accord* Comments of CTIA-The Wireless Association, GN Docket No. 12-354 (Jul. 14, 2014) (“CTIA Comments”), at 3-5.

interoperable with Priority Access devices or from operating even on unassigned PA spectrum, because supposedly GAA devices (which don't yet exist) are uniquely "vulnerable to hacking."⁶

As we argued previously,⁷ it is not difficult to see that Verizon's cynical ploy is aimed both at giving Priority Access networks a huge head start in the market and ensuring the failure of GAA products and services. As a result, Verizon's proposal would preempt most of the spectrum sharing benefits that would otherwise flow from the Commission's vision of a small cell band that is open to intensive use and innovation by interoperable PA and GAA devices assigned on a dynamic basis by a neutral SAS.

Even if Verizon and AT&T were sincere in their claims that creating a separate and exclusive Priority Access band for five years would facilitate a unified band and the development of GAA devices, their proposal is based on a series of shaky premises:

First, the carriers argue that the SAS is not needed to protect Incumbent Access users from interference because "LTE technology will enable PALs to fully protect incumbent operations, including Federal systems."⁸ Putting aside the technical merits of this claim, the dominant carriers and a few of their suppliers seem to assume that LTE – and small cell integration into mobile carrier hetnets – is the only technology and service that will be deployed on a Priority Access basis. For example, in its comments Qualcomm states that it is working with Verizon "to conduct field trials to configure the 3.5 GHz band spectrum as LTE supplemental

⁶ Verizon Comments at 9-10. Although it is unclear why GAA devices would be uniquely vulnerable to hacking, there will be little incentive for an individual to maliciously hack a device for rogue operation on an occupied PA channel if the Commission, as it proposed in the *Public Notice*, reserves a very substantial portion of the band for GAA nationwide *and* authorizes the SAS to extend GAA devices supplemental access to unused PA spectrum on a contingent basis.

⁷ Reply Comments of Open Technology Institute and Public Knowledge, GN Docket No. 12-354 (Dec. 20, 2013), at 8-9.

⁸ AT&T Comments at 22.

downlink with its existing wireless network.”⁹ Accordingly, Qualcomm supports moving ahead with a two-tier, PA-only framework because “the many unproven and untested concepts” of a three-tier framework that includes GAA could unduly delay PA licensees.¹⁰

To the contrary, considering that the national carriers have been laggards in adopting spectrally-efficient small cell solutions, it seems far more likely that wireline ISPs, WISPs, Wi-Fi hotspot aggregators and wholesalers, as well as certain individual establishments (e.g., retailers, office parks, shopping centers), will be the first to acquire Priority Access Licenses (“PALs”) and to deploy a Wi-Fi technology that integrates the 3.5 GHz band into the massive, existing installed base and user routine of Wi-Fi offload. Whether or not some future small cell variation of LTE can coordinate interference avoidance without reference to a geolocation database, Wi-Fi and certain other technologies will need and benefit from the SAS, as well as from an integration of PA and GAA on the same band. And it would be patently unfair to give only LTE and the mobile carriers a head start to lock up the PALs in the most lucrative urban markets.

Second, the dominant carriers assume, contrary to the proposed rules, that “the SAS will simply provide a registration function for PALs, [and so] there is no need to await full implementation of the SAS prior to allowing PALs . . . to operate.”¹¹ Since they assume away the proposed functionalities of the Spectrum Access System, it becomes easy to argue that GAA users need to wait for the SAS to be operational, but mobile carriers deploying LTE do not.

Third, PISC fully agrees with the companies in the WhiteSpace Alliance, which stated that “[t]here is no need to phase in three-tier spectrum management as under the transitional plan proposed by some commenters: database technology can implement a three-tier system, and the approaches required to protect first-tier incumbents can be applied equally effectively to

⁹ Comments of Qualcomm, GN Docket No. 12-354 (Jul. 14, 2014) (“Qualcomm Comments”), at 14.

¹⁰ Qualcomm Comments at 13-14.

¹¹ AT&T Comments at 22.

secondary user protection.”¹² Indeed, the TV Bands Databases already tested and certified by the Commission have demonstrated that a geolocation database approach can protect incumbent licensees operating in geographically-defined areas. Verizon and AT&T offer no reason why this technology and approach cannot protect actual PAL deployments.

Fourth, the Verizon and AT&T assume there will be a long wait for a SAS to be operational and trusted to protect PA operations from GAA users. There is no reason to believe that the development, testing and authorization of two or more SASs will take substantially longer than the development of new standards and devices ready to take advantage of this new small cell band. Prototype SASs have already been developed by Google and others – and the fact that TV White Space databases are already certified and fully operational will certainly shorten the time to market for a SAS that can, at a minimum, enforce the static boundaries of protected contours for Incumbent Access and PAL deployments. Under the Commission’s three-tier proposal, the worst case scenario is that GAA devices and deployments are slower to market. But that is no reason why PAL holders cannot coordinate with the SAS and later rely on it to exclude GAA users from their licensed channels once they notify the SAS of actual use.

Finally, CTIA recycles Verizon’s prior argument that until the Commission develops an ironclad enforcement mechanism to avoid “rogue interference” from GAA devices, PA operators will be at too great a risk to justify substantial investments.¹³ It remains unclear why CTIA and Verizon expect GAA devices to be both uniquely vulnerable to hacking and outside the control of the SAS. For starters, the Commission’s proposed rules would require both PA and GAA devices to operate across the entire band and be certified subject to identical technical parameters to spur more efficient and larger scale production of comparable if not interoperable devices.

¹² Comments of the WhiteSpace Alliance, GN Docket No. 12-354 (July 11, 2014) (“WhiteSpace Alliance Comments”), at 2.

¹³ CTIA Comments at 4-5

CTIA's claims also lack credibility considering that there is little if any opposition to the Commission's proposal that GAA devices (or base stations controlling them) will be registered and identifiable in the SAS, which will deter re-tuning of devices to operate on occupied PA spectrum. In addition, there will be little incentive for an individual to maliciously hack a CBRS device for rogue operation on an occupied PA channel if the Commission, as it proposed in the *Public Notice*, reserves at least half of available spectrum in every market for GAA and authorizes the SAS to extend GAA devices supplemental access to unused PA spectrum on a contingent basis.

Intensive, three-tier access and opportunistic GAA throughout the band must remain the central defining feature of the CBRS, as it was for the PCAST vision of dynamic spectrum sharing and small cell spectrum re-use with low barriers to deployment. The only proven model to achieve high rates of spectrum re-use on a widespread basis and at low cost is open and opportunistic access to *unlicensed* small cell bands. Increasingly, the widespread availability of Wi-Fi operating on unlicensed spectrum is the single most important factor in mitigating the "spectrum crunch." Inherent limitations on the capacity of the current carrier business model suggest that greatly expanded use of unlicensed and small cell spectrum by non-carrier providers and by consumers themselves will be necessary to absorb projected demand, to ensure consumers higher-speed connections, and to promote innovation in machine-to-machine ("M2M") connectivity more broadly.¹⁴

¹⁴ See Michael Calabrese, "Solving the 'Spectrum Crunch': Unlicensed Spectrum on a High-Fiber Diet," Time Warner Cable Research Program on Digital Communications (Fall 2013), at 6-7.

III. GENERAL AUTHORIZED ACCESS: THE RECORD SHOWS STRONG SUPPORT FOR RESERVING A MINIMUM 50% OF THE BAND'S AVAILABLE SPECTRUM FOR GAA USERS AND AUTHORIZING OPPORTUNISTIC GAA USE OF LOCALLY UNUSED PRIORITY ACCESS BANDWIDTH

The record shows strong support from a diverse range of industry commenters for the Commission's proposal to reserve for GAA use a minimum 50 percent of the available spectrum in each and every license area.¹⁵ The proposed floor of at least 50 percent of the available spectrum for GAA in every market is necessary to ensure the certainty needed to spur investment and deployment of chips, devices, applications and services at scale.

The comments also reflected strong and growing support, including by nationwide mobile carriers, for opportunistic access by GAA users to unused Priority Access spectrum. A "use it or share it" policy is the closest thing to a spectrum efficiency "free lunch." Thanks to the automated enforcement mechanism of the SAS, there is absolutely no downside or risk for Priority Access licensees, who would maintain all of their rights to *use* the public resource.

A. Allocating a Minimum Floor of 50% of Available spectrum for GAA Use Nationwide Best Serves the Public Interest

PISC strongly supports the Commission's proposal to "foster a robust GAA ecosystem" by reserving for GAA use a minimum 50 percent of the 3.5 GHz band "in any given census tract."¹⁶ Ensuring a substantial amount of open and opportunistic spectrum on a nationwide basis is critical for developing markets with scope and scale for innovative and affordable chips, devices, applications and services. It is also a likely prerequisite to the benefits of a mass market for interoperable and dynamic frequency devices that can operate on either a PA or a GAA basis.

Other parties supported a similar "floor" for GAA spectrum availability in every market nationwide. For example, the Wi-Fi Alliance supports "a floor of 50 percent of available

¹⁵ *FNPRM* at ¶ 11.

¹⁶ *Ibid.*

spectrum for GAA use” so that manufacturers and service providers have the incentive and certainty they need to quickly develop and deploy products and services in the band.¹⁷ The Utilities Telecom Council supports reserving “at least 50 percent of the available spectrum in the 3.5 GHz band in a given area” for GAA,¹⁸ as does the American Petroleum Institute, WISPA and Shared Spectrum Company.¹⁹ Spectrum Bridge opined that 50 percent for GAA “is a good starting point.”²⁰ Google previously suggested a guaranteed set-aside for GAA in the range of 50 megahertz or more in comments responding to the *Licensing Framework Public Notice*.²¹

Microsoft asserted that “[t]he Commission should set aside the *greater of 50 MHz or 50 percent of non-incumbent spectrum within each census tract for GAA use.*”²² PISC shares Microsoft’s view that because of the possibility that Incumbent Access services could preempt use of a substantial share of the band in certain areas, it would be preferable to formulate the minimum amount of spectrum available to the public for GAA use as the greater of 50 MHz or 50 percent of the bandwidth available in each licensing area.

Verizon set forth the contrary view that PALs should be permitted to exceed 50 percent of the available bandwidth in a market if the total bandwidth is reduced to protect an Incumbent Access service.²³ PISC opposes this proposal. There is no basis to assume *a priori* that a PA user

¹⁷ Comments of Wi-Fi Alliance, GN Docket No. 12-354 (Jul. 14, 2014) (“Wi-Fi Alliance Comments”), at 6.

¹⁸ Comments of Utilities Telecom Council, GN Docket No. 12-354 (Jul. 14, 2014) (“Utilities Telecom Council Comments”), at 2, 9.

¹⁹ Comments of American Petroleum Institute, GN Docket No. 12-354 (Jul. 14, 2014) (“American Petroleum Institute Comments”), at 10 (a 50 percent floor for GAA “strikes a reasonable balance between potential user requirements”); Comments of The Wireless Internet Service Providers Association, GN Docket No. 12-354 (Jul. 14, 2014) (“WISPA Comments”), at 16; Comments of Shared Spectrum Company, GN Docket No. 12-354 (Jul. 14, 2014) (“Shared Spectrum Company Comments”), at 9.

²⁰ Comments of Spectrum Bridge, GN Docket No. 12-354 (Jul. 14, 2014) (“Spectrum Bridge Comments”), at 4.

²¹ Comments of Google in response to *Licensing Framework Public Notice*, GN Docket No. 12-354 (Dec. 5, 2013)(“a fixed amount of . . . 50 MHz would be available in every market for GAA operations”).

²² Comments of Microsoft at 3 (emphasis added).

²³ Verizon Comments at 19.

would incur any greater loss of functionality than a GAA user due to a proportional reduction in bandwidth; or that PAL spectrum is being put to some higher purpose than GAA spectrum. Indeed, we expect that operators will discover that, like Wi-Fi, small cell deployments using primarily “best efforts” GAA spectrum are a better value proposition. Moreover, the PA user can (and probably will) also incorporate GAA spectrum and can use that ‘best efforts’ spectrum to compensate for any reduction in total bandwidth. Assuming *arguendo* that the Commission did decide to prioritize the bandwidth available to a PA licensee in this situation, it should be for a period no longer than the remainder of the current one-year licensing period.

Finally, although T-Mobile supports the proposed three-tier framework, it proposes that a far higher share of the band be set aside for PALs (40 MHz guaranteed, plus 50 percent of any additional bandwidth available in each licensing area).²⁴ T-Mobile appears to view the 40 MHz guarantee as insurance against the possibility that a Federal Incumbent Access user will preempt a large portion of the band in a particular area. In our view, it better serves the public interest to ensure 50 megahertz or more of open GAA spectrum in every market nationwide, at least at the outset. As T-Mobile opines, a carrier might be reluctant to deploy in certain specific coastal areas due to the risk of preemption. However, if the policy goal is investment in the scale manufacturing and deployment of GAA *and* PA devices, then it is far more important that the Commission provide certainty that off-the-shelf GAA devices will be useable in every market nationwide.

Although PISC does not oppose an experiment with Priority Access licensing on a substantial portion of the 3.5 GHz band, our groups once again ask the Commission to bear in mind that the only proven model to achieve high rates of spectrum re-use on a widespread basis and at low cost is open and opportunistic access to *unlicensed* small cell bands. If the unexpected

²⁴ Comments of T-Mobile USA, GN Docket No. 12-354 (Jul. 14, 2014) (“T-Mobile Comments”) at 5.

occurs – and mobile carriers make intense use of PALs, while GAA spectrum remains barren – among the many virtues of a dynamic, three-tier access system governed by a neutral geolocation database manager is that the relative allocation (ratio) is changeable over time.

B. Opportunistic GAA on a ‘Use it or Share it’ Basis

PISC strongly supports the Commission’s proposal to “allow GAA use on unused PAL channels,”²⁵ and to include “bandwidth not yet assigned to PALs, or where assigned bandwidth is not in actual use by PA Licensees.”²⁶ We agree that the ‘use it or share it’ approach proposed by the Commission will “promote efficient and consistent use of spectrum” and best serves the public interest.²⁷

The record shows that strong support continues to grow among a diverse range of parties for this common sense approach to squeezing the greatest public benefit from a finite public resource. As the *FNPRM* correctly observed, “a broad coalition of broadband service providers, manufacturers, trade associations, and technology companies argued for . . . allow[ing] GAA use over PA channels that are not in actual use.”²⁸ For example, T-Mobile reaffirmed that the company “supports allowing GAA users to access PA spectrum when it is unassigned or affirmatively unused.”²⁹ WISPA, Google, the Wi-Fi Alliance, the Utilities Telecom Council, Shared Spectrum Company, Southern Company Services, Spectrum Bridge, and the White

²⁵ *FNPRM* at ¶ 36.

²⁶ *Id.* at ¶ 29.

²⁷ *Id.* at ¶ 36.

²⁸ *Ibid.*

²⁹ T-Mobile Comments at 5. Verizon states that it “does not oppose GAA use of . . . PAL channels that the licensee is not using,” although it also proposes a troubling exception discussed just below. Verizon Comments at 10.

Spaces Alliance are among the other parties strongly endorsing the Commission’s proposal for more efficient, opportunistic access.³⁰

T-Mobile goes on to recommend that PAL operators be “required” to notify the SAS “when they initiate operations in an area,” so that GAA users can be excluded from the PAL spectrum at the appropriate time and place.³¹ The Wi-Fi Alliance takes this a step further, proposing near real-time notification of PAL use so that unused bandwidth can be employed to the maximum extent feasible.³²

The Commission requests comment on how “use” should be “practically and consistently determined” for the purpose of implementing a “use it or share it” approach. In initial comments filed jointly with the Dynamic Spectrum Alliance and the WhiteSpaces Alliance, PISC stated that “if PA licensees offer service in only a portion of the license area, then the remaining area should be open for shared use by GAA users on a non-interfering basis.”³³ Similarly, Google suggested that “if the Commission does not base PAL areas on actual Priority Access deployments, it should define ‘unused’ spectrum . . . to include all geographic portions of a PAL area where the licensee does not operate,” along with any margin the SAS determines is needed to protect the actual PAL operations from harmful interference.³⁴ The default position for the SAS should be to assign the unused portion of a census tract to the pool of available GAA spectrum on a temporary basis.³⁵

³⁰ WISPA Comments at 27; Comments of Google, GN Docket No. 12-354 (July 14, 2014) (“Google Comments”), at 10, 18; Wi-Fi Alliance Comments at 6; Utilities Telecom Council Comments at 9; Shared Spectrum Company Comments at 10; Comments of Southern Company Services, GN Docket No. 12-354 (July 14, 2014) (“Southern Company Services Comments”), at 2; Spectrum Bridge Comments at 4; WhiteSpace Alliance Comments at 3.

³¹ T-Mobile Comments at 5.

³² Wi-Fi Alliance Comments at 6.

³³ Comments of Dynamic Spectrum Alliance, et al., GN Docket No. 12-354 (July 14, 2014), at 2.

³⁴ Google Comments at 18.

³⁵ Google Comments at 18.

As our groups, Google and other stated, allowing the SAS to manage GAA use of partial license areas is particularly important if PAL areas are as large as census tracts. If a PAL is intended for a particular office park, cluster of buildings, or even a small neighborhood or town in a large census tract (some cover hundreds of square miles or more), much of the bandwidth on that 10 MHz channel could be wasted if the SAS is not authorized to allow at least GAA use in a manner that won't impose harmful interference on the licensed operation.

The *FNPRM* asks what triggering event should cause the SAS to begin excluding GAA users from unused PA spectrum in a particular licensing area, T-Mobile suggests that "PAL users should be *required* to notify the SAS when they initiate operations in an area."³⁶ However, the Commission does not need to *require* notification, since it's possible certain PA licensees will decide not to deny access to GAA use – which, in geographically cabined areas, may be primarily devices controlled by affiliated users (employees, clients, etc.). Our groups suggest that the rules should simply require that the SAS authorize GAA use of any unused PAL spectrum until one of the SAS administrators receives a notification from the licensee – a process that should be made easy through an online portal.

Our groups agree with Verizon that the SAS should not need to "make judgments about what spectrum is in 'actual use'."³⁷ However, to avoid this, it is imperative that the Commission clearly define "actual use" and leave it to the discretion of the PAL operator to notify the SAS if and when its actual operations need to preclude opportunistic GAA use of bandwidth in a specified area.

Accordingly, to promote spectrum efficiency, the Commission should explicitly require that PAL user notifications are precise with respect to each licensing area concerning the

³⁶ T-Mobile Comments at 5 (emphasis added).

³⁷ Verizon Comments at 11 ("the determination should come directly from the PA licensee").

geographic area of coverage, transmit power, dates that service will commence, and other basic parameters so that the SAS can determine what portions of the license area (e.g., census tract) can still be used for at least certain GAA use cases (e.g., at very low power or indoors). The Commission should allow PA licensees to notify the SAS that they need to occupy the channel for testing or other purposes on a particular date – but the Commission should also explicitly require that a SAS cannot deny access to PA spectrum prior to the date of actual and ongoing operation.

Verizon further states that although it “does not oppose GAA use of . . . PAL channels that the licensee is not using,” the rules should not permit GAA use where a PA licensee “dedicates a channel in all or a portion of its license area as a guard band to protect its network from interference.”³⁸ Verizon’s proposal amounts to a blank check for warehousing spectrum. It is also completely unnecessary, since the proposed rules establish out-of-band emission limits sufficient to protect neighboring PALs.

If the Commission agrees to permit licensees to maintain fallow spectrum as “guard bands,” it should also require that the unused spectrum that is off limits to opportunistic GAA use by the public must be reasonably tailored to protect the PA licensee’s *actual* operations from harmful interference. It seems unlikely that an entire census tract would be needed as a guard band against a low-power, small cell service. Based on the notification of guard band “use,” the SAS should be required to authorize requested GAA operations on the unoccupied bandwidth (e.g., low-power indoor or point-to-point use) that would not cause harmful interference with actual PAL operations in adjacent PAL areas.

Finally, PISC also supports the Commission’s proposal to authorize the SASs to assign a variable amount of bandwidth to GAA users, depending on a combination of their need and

³⁸ Verizon Comments at 10.

availability.³⁹ We agree with the Commission that it will be spectrally more efficient – and potentially accommodate more GAA users – if the SAS dynamically determines the optimal assignment based on location, service, transmit power and, of course, the constraints imposed by the obligation to protect adjacent or co-channel Incumbent Access and PA users.

C. Contained Access Facilities

PISC shares the concerns raised by many commenters about the proposal to allow a fourth category of users, Contained Access Users (CAUs) and Facilities (CAFs), that can claim exclusive use of 20 MHz of the GAA spectrum otherwise set aside for the general public.⁴⁰ As Microsoft stated, “the *FNPRM*’s proposal on eligibility for this spectrum use is vague, creating the potential for a large number of users to claim reserved spectrum on the GAA tier.”⁴¹ And as Sony correctly cautioned, this proposal would “have the effect of limiting, or some cases eliminating, the spectrum available for GAA use in a given geographic area.”⁴²

Indeed, it appears that the record demonstrates a consensus of opposition to authorizing a CAF to wall off exclusive use of GAA spectrum, rather than simply conform to the three-tier access model and choose whether a PAL or GAA use (or some other band or resort to secondary markets or contracted services) will meet its need.⁴³ Important public service-related communications should obtain a PAL if they need interference protection; or lease from a PAL holder.⁴⁴ They can also seek to control device use within their facilities – as theaters, hospitals and certain other venues do today – and operate on a GAA basis.

³⁹ See *FNPRM* at ¶¶ 33-35.

⁴⁰ See *Id.* at ¶¶ 58-61.

⁴¹ Microsoft Comments at 4.

⁴² Comments of Sony Electronics, GN Docket No. 12-354 (Jul. 14, 2014) (“Sony Comments”) at 2.

⁴³ See, e.g., Wi-Fi Alliance Comments at 7-8; Mobile Future Comments at 7-8.

⁴⁴ Wi-Fi Alliance Comments at 8.

Although our groups are sympathetic to the Commission’s desire to meet the perceived needs of certain “mission critical” public safety and other public entities for indoor quality of service using 3.5 GHz spectrum, PISC suggests that these exclusive-use reservations should properly be Priority Access Licenses and not diminish the GAA spectrum available to the public at large.⁴⁵ Permitting CAUs to obtain PALs for relatively small and tailored license areas would be another reason for the Commission to adopt its proposed alternative approach to census tract areas, based on “employing a fine grained grid of ‘pixels’” (discussed further in Section V below).⁴⁶ If CAUs can acquire PALs of an appropriate size, they would also benefit from the flexibility of both indoor and outdoor use.

If the Commission does decide to adopt its proposal to permit CAUs to register exclusive indoor use of GAA spectrum, we strongly agree that CAUs should have no protection from devices outside their facility. Carving out islands of GAA exclusion around CAFs would add complexity and severely undermine the availability and utility of GAA spectrum. In addition, our groups agree with WISPA and Microsoft that the definitions in proposed Section 96.3 are too general and overly broad.⁴⁷ CAF eligibility should be narrowly limited to public safety agencies, hospitals, local governments and possibly public utilities for only indoor and internal, non-commercial communication in support of core public service functions.

⁴⁵ *Accord* Microsoft Comments at 5; WISPA Comments at 28; Wi-Fi Alliance Comments at 7-8.

⁴⁶ *See FNPRM* at ¶ 46.

⁴⁷ WISPA Comments at 29; Microsoft Comments at 4.

IV. THE RECORD OVERWHELMINGLY SUPPORTS MINIMIZING OR ELIMINATING COASTAL EXCLUSION ZONES BASED ON POTENTIAL INTERFERENCE FROM INCUMBENT FEDERAL SYSTEMS

While the record reflects divergent views among various parties concerning many elements of the proposed Citizens Broadband Radio Service, there is complete consensus in the record that the Commission must act as an *independent* regulatory agency and reject large and static “exclusion zones” that are not absolutely necessary to protect Federal incumbent operations from harmful interference, as well as any claims that private sector PA or GAA devices must be involuntarily protected from Federal incumbent transmissions.

The Commission should calculate protection zones for incumbents based only on the interference tolerance of incumbent operations and not the tolerance of potential new operations. While incumbents in the 3.5 GHz band have a right to protection from harmful interference, new entrants should be allowed to choose to operate in environments where they may encounter interference – and to respond to market incentives to develop technological advances that improve quality of service over time.

There is a strong consensus in the record on these two points because of the certainty that at least GAA access to the 3.5 GHz band nationwide is necessary to drive investment and the large-scale deployment of chips, devices, applications and services for a CBRS. PISC agrees with the widespread view expressed in the comments that a national footprint – without wholesale exclusion zones in coastal areas – is necessary to establish a commercially viable GAA ecosystem.⁴⁸

⁴⁸ See, e.g., Microsoft Comments at 6 (“a national footprint with the smallest possible exclusion zones is essential for convincing the private sector to make the significant investments necessary to develop and manufacture devices capable of leveraging 3.5 GHz GAA spectrum”); CTIA Comments at 2 (“The proposed exclusion zones will vitiate the band’s commercial utility by rendering large swaths of the country unable to use 3.5 GHz devices.”); Google Comments at 9 (“spectrum must be available on a near-nationwide basis . . . to foster the ‘next generation of shared spectrum technologies.’”).

A. Replace Outdated and Static Exclusion Zones with Coordination Zones

The comments filed evidence an overwhelming consensus from diverse industry segments that the exclusion zones calculated by NTIA to protect incumbent Federal radar operations should be drastically reduced and possibly eliminated entirely.⁴⁹ The *FNPRM* acknowledges that the exclusion zones calculated by NTIA cover 60 percent of the U.S. population due to “technical assumptions typical of traditional macrocell deployments,”⁵⁰ and that some of the NTIA’s assumptions no longer apply and “need to be revisited.”⁵¹

PISC is therefore encouraged that the Commission “plan[s] to work with NTIA in the coming months to reassess these exclusion zones in light of new technologies envisioned in the *FNPRM* and new data from technical studies evaluating the coexistence of radar and wireless broadband services.”⁵²

PISC agrees with Google that static geographic exclusion zones are neither necessary nor spectrum efficient.⁵³ Static geographic exclusion zones “assume the worst case on a wholesale basis” and as a result are necessarily “overly protective of incumbents and overly restrictive for commercial operations.”⁵⁴ Our groups agree there should be no absolute “exclusion” zones, but rather “coordination zones” where the SAS can coordinate with Federal incumbents to allow PA and GAA operations at certain times and under certain conditions.⁵⁵ While the ability to coordinate operations in these zones may take more time, or even new technical developments,

⁴⁹ See, e.g., NCTA Comments at 6-8; Wi-Fi Alliance Comments at 14-15; CTIA Comments at 11; Google Comments at 2-3; WISPA Comments at 17-20; Microsoft Comments at 2-4, 10; Comments of Motorola Mobility at 12-13; Comments of Nokia Solutions and Networks US, GN Docket No. 12-354 (Jul. 14, 2014) (“Nokia Comments”) at 5.

⁵⁰ *FNPRM* at ¶ 12. NTIA assumed that commercial networks would be licensed for high-power, high-site macrocell operations. See Google Comments at 2-3.

⁵¹ *FNPRM* at ¶ 139.

⁵² *FNPRM* at ¶ 5.

⁵³ Google Comments at 10.

⁵⁴ *Ibid.*

⁵⁵ See T-Mobile Comments at 6-7.

the “coordination zone” concept better serves the public interest since it does not foreclose more shared and intensive combined use of the spectrum.

B. GAA Users Should Not be Protected from Incumbent Federal Users

PISC was heartened to see that despite disagreements on certain other issues, virtually all parties agree that the Commission’s rules should in no way seek to protect PAL or GAA operations from interference that could hypothetically result from high-power naval radars.⁵⁶ PISC strongly supports the Commission’s position in the 2012 NPRM that “the calculation of Incumbent Use Zones should be designed to prevent commercial interference into radar, not interference from DoD radar into commercial system[s].”⁵⁷ We recommend that the Commission define geographic exclusion zones for GAA users based *only* on the separation distances (if any) that are essential to protect Incumbent Access systems from harmful interference – and permit a combination of the SAS, private sector technical innovation and consumer choice to determine what level of interference risk to commercial uses is tolerable.

The *FNPRM* requests comment on the costs and benefits of requiring that PA and even GAA devices should be able to tolerate interference from high-powered naval radar within distances of 1 kilometer or less.⁵⁸ The clear answer is that any requirement that PA or GAA devices must have filters or other technical means of withstanding naval radar is unnecessary and

⁵⁶ See, e.g., NCTA Comments at 8; Wi-Fi Alliance Comments at 14-15; AT&T Comments at 36-37 (“PAL and GAA operations would be operating on a secondary and tertiary basis and would have no protection rights . . . there is simply no need for protection zones to encompass protection of commercial systems from Federal operations”); Google Comments at 4-5; Microsoft Comments at 9; Motorola Mobility Comments at 12-13; Nokia Comments at 6.

⁵⁷ *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Notice of Proposed Rulemaking and Order, GN Docket No. 12-354 (rel. Dec. 12, 2012), at ¶ 116. As the *FNPRM* observes, the notion of coastal exclusion zones that would exclude 60 percent of the U.S. population from access to the mostly fallow 3550-3650 GHz band originated in the NTIA’s recommendation “to protect new commercial systems from co-channel interfere from high-powered military in-band shipborne and adjacent band DoD ground-based radar systems.” *FNPRM* at ¶ 9.

⁵⁸ See *FNPRM*, ¶¶ 143-144.

unjustifiably burdensome. We agree with Google that any such requirement “would dramatically and unnecessarily limit spectrum sharing.”⁵⁹ It would also set a bad precedent that would undermine the PCAST approach to Federal band sharing and harm the public interest.

Federal Incumbents should have no legitimate concern that private sector users will either operate or accumulate “squatter’s rights” in bands or in locations that are not authorized. It is explicit in the proposed rules that neither PA nor GAA operations have any expectation of interference protection from Federal incumbent operations – now or in the future. Indeed, the PCAST report was equally explicit – as the FCC should be – that the Spectrum Access System can and should ensure that *new* and *modified* Federal systems continue to have primary rights.⁶⁰

The claim that allowing private sector sharing on federal bands ultimately undermines the primary rights of Federal incumbents is often trotted out as the “garage door opener” dilemma. However, this is a complete myth. As Google accurately describes in its comments, the reality is that the FCC immediately and effectively defended the rights of Federal incumbents to introduce new operations even when this caused harmful interference to long-established and legitimate consumer use of devices with secondary status in a Federal band (in that case, garage door openers used in homes close to military bases).⁶¹

The Commission can facilitate greater spectrum efficiency and innovation by giving private sector innovators and operators the opportunity to determine their own tolerance for interference and to develop a variety of approaches to coexist with high-power radar transmissions. While incumbents in the 3.5 GHz band have a right to protection from harmful interference, new entrants with secondary status should be allowed to choose to operate in

⁵⁹ Google Comments at 4-5.

⁶⁰ PCAST Report at 36.

⁶¹ Google Comments at 5-6.

environments where they may encounter interference – and to respond to market incentives to develop technological advances that improve quality of service over time.

V. PRIORITY ACCESS LICENSES

A. Licensing Areas

If the Commission decides to use traditional, static geographic areas for licensing, PISC agrees that census tracts could represent a workable “middle ground” compromise.⁶² PISC and Microsoft previously proposed census Block Groups, which are one-third the area of census tracts. PISC has also endorsed Google’s proposal to use dynamic protection contours that are calculated by the SAS based on the planned PA deployment and the actual interference protection needed.⁶³ At the other extreme, the national wireless carriers and their suppliers all propose a more traditional licensing scheme, with far larger geographic areas and far longer licensing terms.⁶⁴

Although census tracts represent a reasonable compromise, we also encourage the Commission to reconsider the potential trade-offs associated with static geographic licenses as large as census tracts in a small cell band that is intended to spur innovation and decentralized adoption among a wide variety of entities, including local entities (school campuses, office parks, shopping centers, neighborhood wireless networks) that may demand interference protection over only a small portion of a census tract. Comments filed by Google and NCTA also identified potentially troubling “boundary issues” that arise because of the way census tracts are defined, particularly in cities.⁶⁵

⁶² See *FNPRM* at ¶ 46.

⁶³ See Google Comments at 16-17.

⁶⁴ T-Mobile, for example, proposes licensing areas no smaller than counties. T-Mobile Comments at 9.

⁶⁵ Google Comments at 16 (“roughly one quarter of the land area of the US could be unsuitable for outdoor deployments . . .”). Google describes other problems with static census tracts as well. *Id.* at 11-16.

If the Commission does not adopt an interference-based approach directly, PISC agrees with Google that the SAS can define PA licensing areas that better match the operational and protection contours of a wide variety of potential users by using a grid of standardized but smaller geographic “pixels.” Our groups agree that the Commission’s proposed alternative approach, based on “employing a fine grained grid of ‘pixels’” that “can be combined to approximate, with high resolution, the operational and protection contours of various system deployments,”⁶⁶ would represent a better compromise between the desire for uniform licensing units and maximizing the utility of the band for a wide variety of use cases and future innovation.

B. Package Bidding

The *FNPRM* seeks comment on whether the Commission should adopt package bidding if it adopts “census tracts, or something smaller, as the appropriate geographic license area.”⁶⁷ PISC strongly opposes package bidding for this band. Package bidding could completely negate the benefits of small licensing areas. Most obviously, local entities seeking one or more PALs for very localized purposes (e.g., covering a college campus, an office park or neighborhood) could be denied a PAL tailored to their need even if they were willing to bid more for that particular license than a large regional operator. This problem would be exacerbated by the Commission’s proposal to allow entities to acquire as much as 30 MHz of PAL spectrum – and lock it up for as long as five years.

At the same time, we acknowledge the legitimate concern of potential wide area operators who do not want to end up with “coverage holes” (and reliance on GAA spectrum) for what they planned to market as a quality-of-service offering. If the Commission determines that package bidding is in the public interest, then our groups suggest that package bids be limited to

⁶⁶ *FNPRM* at ¶ 46.

⁶⁷ *Ibid.*

10 MHz or at most 20 MHz. This compromise could ensure that one or more licensees can achieve area-wide (even regional) quality of service, for at least a certain level of capacity, while in most cases leaving at least some PA spectrum available for more localized or small-area operators seeking only a single or small number of licenses.

C. Aggregation Limits

The Commission proposes that licensees would be permitted to acquire and hold as many as three 10 MHz PALs (30 megahertz) in a census tract.⁶⁸ This is too high unless, in a particular year, there is no mutual exclusivity.⁶⁹ PISC continues to recommend that an entity (and any related entities) should be eligible to license no more than 20 megahertz at any one time in a given license area.⁷⁰ The CBRS is far less likely to spur innovation if there are only two licensees in many of the most desirable areas. For example, if the Commission allocates up to 50 megahertz in each area for PA licensing, then a limit of 20 megahertz would permit at least three entities to acquire the interference protection of a PAL.

If the Commission decides that a 20 megahertz limit is insufficient, then it should consider adopting a relative cap, as a percentage of PAL spectrum available in a license area, as suggested by Motorola Mobility.⁷¹ In any event, we urge the Commission not to permit any single entity to control more than 50 percent of the PAL bandwidth in any licensing area.

⁶⁸ *FNPRM* at ¶ 55.

⁶⁹ However, in that situation the Commission should still restrict an aggregation greater than 20 MHz to a single license term, so that future entrants and potential competitors are not foreclosed from bidding over a multi-year period.

⁷⁰ See Comments of Open Technology Institute at the New America Foundation, Public Knowledge, GN Docket No. 12-354 (Dec. 5, 2013), at 19.

⁷¹ Motorola Mobility Comments at 5.

VI. SPECTRUM ACCESS SYSTEM

A. The SAS Should Dynamically Coordinate and Assign Both PAL Channels and GAA Bandwidth

PISC was pleased to see substantial support for the Commission's proposal to authorize the SAS to dynamically assign channels to PA licensees and variable amounts of bandwidth to GAA users, depending on demand and other factors.⁷² Our groups agree with the Commission's rationale for assigning channels of 10 megahertz to PALs, whereas both the bandwidth and specific frequencies available for GAA use would be determined by the SAS dynamically.⁷³ However, we also agree with Google's suggestion that the Commission should require that both GAA and PAL devices have the capability to operate in 10 MHz channels, since this would promote consistent technical rules and economies of scale.⁷⁴

Dynamic frequency assignment by the SAS will confer a number of important public interest benefits for users overall. First, it can better accommodate and protect Incumbent Access operations, such as naval radar, including the evolution of their systems in the future. If channels are assigned on a static basis, the need to protect a federal incumbent system on a particular channel could shut down a particular PA licensee completely, whereas with dynamic assignment the SAS can at least attempt to assign an alternative channel. No equipment would be "stranded" even if a particular channel became permanently unavailable.

Second, dynamic assignment facilitates more intensive and productive use of the entire band. As the SAS evolves, dynamic assignment should make it possible to fit more users and uses in a given geography, particularly if the precise location, transmit power, interference tolerance and perhaps sensing data from devices in an area can be factored into the calculations.

⁷² *FNPRM* at ¶¶ 28, 64.

⁷³ *FNPRM* at ¶ 29.

⁷⁴ Google Comments at 28.

Conversely, dynamic assignment can prevent any potential “tragedy of the commons” since the SAS can, if necessary, limit the number of GAA users on a channel in any particular area.

Third, dynamic assignment can also facilitate the coexistence of small cell and higher power users in rural areas. There are currently more than 2,000 active licensees operating at higher power in tens of thousands of registered locations on the 3650-3700 MHz band under the Commission’s Part 90, Subpart Z “light licensing” rules. Although we support making a substantial portion of the 3550-3650 MHz band available for higher-power operations in rural areas that enable WISPs and other users, this must also be coordinated with small cell users to achieve the “coexistence . . . between disparate systems” that the *Revised Framework Public Notice* correctly identified as a goal.⁷⁵ The Commission should additionally require the SASs to dynamically assign PAL and GAA frequencies to minimize interference between higher power and small cell users.

Finally, a requirement of capability to tune across the entire band will further encourage common standards and interoperability among both PA and GAA devices. As Wi-Fi has demonstrated, a common standard across a sufficiently wide band of spectrum can spur scale economies that reduce costs and encourage adoption.

B. Information Used to Permit or Deny the Public Access to GAA or PA Spectrum Must be Retained and Fully Transparent to the Public

PISC fully support the Commission’s proposal “that the SAS retain information on all operations within the 3.5 GHz band,” including “all data that [Citizen Broadband Radio Service Devices (“CBSDs”)] are required to transmit to the SAS pursuant to the proposed section 96.36.”⁷⁶ It is critical for the credibility and accountability of the CBRS that the informational

⁷⁵ “*Commission Seeks Comment on Licensing Models and Technical Requirements in the 3550-3650 MHz Band*,” GN Docket No. 12-354, FCC 13-144 (rel. Nov 1, 2013), at ¶ 47.

⁷⁶ *FNPRM* at ¶ 99.

inputs and outputs of each SAS be completely transparent to the public – particularly to the press, academic researchers and consumer advocates.

Transparency is especially important concerning data – such as the exclusion zones protecting FSS operators and the notifications of “actual use” of Priority Access license areas – that a SAS uses to deny the public use of the public spectrum. Since the Commission is effectively delegating its enforcement authority to privately-operated SASs to enforce exclusions from the public airwaves, reducing opportunities for communication and free expression, it is imperative that the SAS enforcement system be as transparent as possible, while protecting only as necessary the identifying portion of certain proprietary data.

C. Consumers Should Not Need to Register End-User Devices With the SAS if They are Controlled by Registered Base Stations or Networks

PISC agrees with comments suggesting that the Commission clarify that end-user devices do not need to register with the SAS, or be directly in contact with the SAS, if they are under the control of a CBSD that is compliant. We agree with Microsoft, Google and other parties asserting that consumer handsets, M2M nodes and other devices controlled by a registered based station or network access point should not need to individually register with SAS.⁷⁷ End user devices should be able to interact with the SAS through an intermediary base station or network that controls them, which is consistent with enterprise Wi-Fi and community mesh Wi-Fi deployments. It is also consistent with the distinction between Mode 1 and Mode 2 devices in the Commission’s Part 15 rules governing unlicensed access to the TV White Space spectrum.

In addition, our groups agree with Google and Telcordia/iConnectiv that the Commission should further clarify the rules to provide that a CBSD can interact with the SAS through an intermediate entity that controls it, such as a network provider. As Google notes, “it is not

⁷⁷ Google Comments at 27; Microsoft Comments at 10-11.

necessary that the [CBSD] communicate directly with a SAS” if it is controlled by a proxy that receives the same information and ensures that instructions from the SAS are implemented in a timely manner.⁷⁸

D. There is Support for the Commission’s Proposal to Require CBS Devices to Provide General Radio Environment Signal Level Measurements to the SASs

PISC supports the Commission’s proposal to require CBSDs to measure and report back to the SAS on their “local signal level environment” in order to improve the ability of the SAS to address real time interference issues.⁷⁹ We agree with Google and other parties that this can provide a “valuable tool for managing interference and promoting productive coexistence between multiple operators in the 3.5 GHz band.”⁸⁰

E. The Commission Should Authorize Multiple SAS Administrators While Also Protecting Consumers from Unreasonable Fees

There is strong support among commenters for the Commission’s proposal to authorize multiple and potentially competing SAS administrators, based on a qualification, testing and public notice process similar to the one that has worked successfully in the TV White Space context.⁸¹ AT&T, Microsoft and Google numbered among the many parties supporting the selection of multiple SAS administrators that would be required to synchronize data relevant to interference protection, but which could also compete on value-added services.⁸² PISC also strongly supports this approach.

⁷⁸ Google Comments at 27. *Accord*, Comments of Telcordia Technologies Inc. (D.B.A. iConnetiv), GN Docket No. 12-354 (July 14, 2014), at 5. Telcordia notes that in the particular case of “CBSD devices that are managed by mobile network operators, the SAS should support interaction with an OSS [operational support system] . . . to allow operator-managed frequency assignment within their network instead of communications directly between the SAS and individual CBSDs.” *Ibid*.

⁷⁹ *FNPRM* at ¶¶ 66, 101.

⁸⁰ Google Comments at 29; *FNPRM* at ¶ 66.

⁸¹ *FNPRM* at ¶ 91.

⁸² See AT&T Comments at 32-34; Microsoft Comments at 12; Google Comments at 32-33.

The *FNPRM* requested comment on whether SAS administrators should be able to impose user fees on GAA users as well as on PA users.⁸³ We agree with parties that note that GAA users will be similarly situated to unlicensed device users relying on TV White Space Database administrators and it would be reasonable to expect both PA and GAA users of the band to help defray the costs of SAS coordination.⁸⁴

Although SAS administrators should be authorized to impose at least nominal fees on GAA operations, as PISC argued in the context of the TVWS rules, transaction costs will be high and unduly burdensome if consumers purchasing off-the-shelf devices are required to individually subscribe to a company operating a SAS. Although costs must be defrayed, the Commission should closely monitor and do everything possible to encourage SAS administrators to minimize transaction costs by collecting their fees on a one-time basis and ideally through wholesale arrangements with device manufacturers, or network operators, that can incorporate this cost into the commercial relationship (or transaction) they already have with individual users. An individual subscription and credit card payment may be necessary for certain users and use cases – and we do not propose precluding it – but when the Commission reviews requests for certification as a SAS administrator, it should consider rejecting firms that propose collecting fees that are either unreasonably high or entail unnecessarily high transaction costs.

More generally, we concur with AT&T's support for the Commission's proposal to review fees, on request, and "require changes if fees are found to be excessive."⁸⁵ Conversely, T-Mobile proposes that the SAS administrators should not be authorized to charge fees to PA users.⁸⁶ This is apparently premised on other T-Mobile proposals that would entirely negate the

⁸³ *FNPRM* at ¶ 99.

⁸⁴ See Google Comments at 33; Verizon Comments at 16.

⁸⁵ AT&T Comments at 34; *FNPRM* at Appendix A, § 96.49.

⁸⁶ T-Mobile Comments at 15.

role of the SAS in relation to PA licensees by assigning fixed and static channels for 10-year periods and not allowing the SAS to determine variable power or other operating parameters depending on the Federal incumbents and other neighboring uses of the band. PISC strongly disagrees with this proposal. PA licensees may or may not pay at auction for *exclusive* use of a channel, but this is entirely their choice and a payment to the government that is entirely separate from their obligation to pay a share of the costs of managing the SAS on behalf of all users.

VII. RADIO REQUIREMENTS: PA AND GAA DEVICES SHOULD OPERATE ACROSS THE ENTIRE 3550-3700 MHZ BAND, SUBJECT TO COMMON OPERATING PARAMETERS AND HIGHER POWER IN RURAL AREAS

A. All Devices Must Be Capable of Operating Across the Entire Band

PISC fully supports the Commission’s effort to impose common technical rules on PAL and GAA devices that promote both dynamic frequency assignment and a mass market ecosystem of devices that can operate on either licensed (PAL) or unlicensed (GAA) spectrum. Our groups join a diverse number of commenters that supported the Commission’s proposal to require that all PA and GAA devices be capable of operating throughout the entire 3550-3700 MHz band.⁸⁷ We share the Commission’s goal to “ensure that all CBSDs and End User Devices certified to operate in the band would be capable of sending and receiving information regardless of the frequencies assigned by the SAS.”⁸⁸

Although both GAA and PA devices should be capable of operating in 10 MHz channels, GAA devices should also be certified to operate in smaller or larger bandwidths, if capable of

⁸⁷ See, e.g., T-Mobile Comments at 12-13; NCTA Comments at 11; Motorola Mobility Comments at 6-7 (also supporting band-wide interoperability); Google Comments at 20 (also opposing band-wide interoperability mandate).

⁸⁸ FNPRM at ¶ 66.

doing so, since the permission to operate on a GAA basis could be greater or less than 10 MHz depending on the location, frequency and time of the request.

B. Power Levels for Rural Areas Should be Harmonized with Current 3650-3700 Rules, While Facilitating Coexistence with Small Cell Operations

PISC was pleased to see strong support for the Commission’s proposal to authorize higher maximum transmit power levels for areas defined as “rural.”⁸⁹ Unfortunately, however, the technical rules proposed in the *FNPRM* fall short of harmonizing the power levels available for fixed wireless broadband in rural areas across the entire 3550-3700 MHz band, so that WISPs and other providers can quickly and effectively expand coverage and improve service to unserved and under-served areas.

We generally agree with WISPA’s proposal that in “rural” areas the rules should establish “a uniform power level of 1 Watt per MHz (25 watts/25 MHz) for all fixed stations, whether located at the base station or at the end user’s location,” just as the light-licensing rules that currently govern 3650-3700 MHz provide today (Part 90, Subpart Z).⁹⁰ This change would conform the end user power levels permitted in rural areas so that consumers of fixed wireless broadband services, and other end users, can communicate with their affiliated CBSDs.

If the Commission is concerned that this will preempt small cell GAA use of the band in rural areas, PISC believes it would be preferable to apply the reduced end-user power levels to a portion of the GAA spectrum in rural areas, rather than render the entire 3550-3650 MHz band less potent for fixed wireless broadband services. As PISC stated in its *Licensing Framework Public Notice* comments, rural areas are both coverage limited and capacity limited – and so access to the 3.5 GHz band should be designed to strike a balance between both of these needs. Non-carrier providers, including individual homes, businesses, schools, retail complexes and

⁸⁹ *FNPRM* at ¶ 74.

⁹⁰ WISPA Comments at 9.

other facilities will exhibit the same demand for added small-cell capacity on a highly-localized basis (e.g., Wi-Fi offloading of mobile device data traffic) as they would in urban or suburban metropolitan areas. Accordingly, if the Commission determines that small cell GAA and higher power fixed wireless operations are incompatible on either a co-channel or adjacent channel basis, then a substantial portion of the GAA spectrum should be reserved for small cell use even in rural areas, or at least in PA licensing areas above a threshold population density.

VIII. THERE IS STRONG SUPPORT FOR EXTENDING THE CBRS RULES TO 3650-3700 MHz WITH PROTECTION DURING A FIXED TRANSITION PERIOD FOR INCUMBENT WIRELESS BROADBAND PROVIDERS

PISC joins the vast majority of comments filed in supporting the Commission’s proposal to extend the proposed CBRS regulatory regime to the 3650-3700 MHz band, subject to a fair but finite transition period for incumbent providers who have deployed pursuant to the current Part 90 “light licensing” rules.⁹¹ Our groups support the Commission’s proposal to grandfather existing WISP and other 3650-3700 MHz operations for a period of five years, thereby granting Incumbent Access status to existing operators within the service contours of their registered base stations or fixed access points during the transition.⁹²

Grandfathered Wireless Broadband Providers have invested millions of dollars to extend service to mostly unserved and under-served areas. We agree with WISPA that it would be both unfair and potentially harmful to rural consumers and communities to disrupt their current operations without substantial notice and a transition period that makes new CBRS-compliant

⁹¹ See, e.g., WISPA Comments at 34; Microsoft Comments at 9-10; AT&T Comments at 21; Google Comments at 19-20; Comments of Nokia Solutions and Networks LLC, GN Docket 12-354 (July 14, 2014), at 11; Wi-Fi Alliance Comments at 10; Motorola Mobility Comments at 3-4; Shared Spectrum Comments at 9.

⁹² See *FNPRM* at ¶¶ 163-169.

equipment more available and affordable.⁹³ Nonetheless, we disagree with WISPA’s proposal that a 3650-3700 MHz band incumbent should not become subject to Part 96 device certification, dynamic frequency assignment and other requirements until it “replaced equipment or registered in a new location.”

PISC proposes instead that the five-year Incumbent Access protection period should begin at the time the first SAS is certified for commercial operation nationwide. If an incumbent operator changes equipment or location during this period, the Part 96 rules should apply going forward, as WISPA proposes. Since it will likely take a year or more for a SAS to become operational nationwide, this transition period would both protect existing investment and services by WISPs, utilities and other users, while providing sufficient time to upgrade equipment to comply with the dynamic frequency assignment and other obligations under the new Part 96 rules.

The Commission should also consider offering Grandfathered Wireless Broadband Providers operators the option, in lieu of the five-year transition period, to obtain PALs covering the census tracts where they currently operate, for at least an initial term, prior to the opening of any general filing window for PALs in the 3650-3700 MHz band.⁹⁴

CONCLUSION

The record in this proceeding overwhelmingly supports the three-tier access framework and implementation rules proposed by the Commission in the *FNPRM*. PISC strongly agrees with most parties in this proceeding who concur that the essential elements of the proposed

⁹³ See WISPA Comments at 34.

⁹⁴ See WISPA Comments at 37. WISPA advances a version of this proposal, although it seems to imply that the initial PAL term would also be 5 years.

Citizens' Broadband Radio Service must include a three-tier access framework for a unified band extending from 3550-3700 MHz, managed by a third-party Spectrum Access System, with a minimum reservation for GAA use of at least 50 percent of the available spectrum in every market nationwide, and opportunistic access to unassigned and unused Priority Access spectrum on a use-it-or-share-it basis.

Open, shared and opportunistic access to small cell spectrum is a proven success in the Part 15 bands where Wi-Fi offload and other wireless innovation is booming. Accordingly, the poison pill proposal by the two dominant mobile carriers to divide the band under the pretense of a "Transitional Framework" should be summarily rejected. Although the licensing of small cells for exclusive use is an unproven concept, PISC agrees that with the appropriate safeguards suggested above, the rapid authorization of a three-tier access Citizens' Broadband Radio Service on a consistent basis across the entire 3550-3700 MHz band best serves the public interest.

Respectfully Submitted,

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