

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

In the Matter of	)	
	)	
Amendment of the Commission's Rules with	)	GN Docket No. 12-354
Regard to Commercial Operations in the	)	
3550-3650 MHz Band	)	

To: The Commission

**COMMENTS OF  
OPEN TECHNOLOGY INSTITUTE AT NEW AMERICA  
AND PUBLIC KNOWLEDGE**

The Open Technology Institute at New America (“OTI”) and Public Knowledge (“PK”) – are pleased to submit these Comments in response to the Second Further Notice of Proposed Rulemaking (“*FNPRM*”) adopted by the Federal Communications Commission (“Commission”) on April 17, 2015.<sup>1</sup>

**INTRODUCTION AND SUMMARY**

OTI and PK greatly appreciate the Commission’s innovative and persistent efforts over the past two years to create a new Citizen’s Broadband Radio Service that both unlocks the tremendous potential of underutilized spectrum in the 3.5 GHz band and creates a three-tier framework for opening additional underutilized bands for dynamic sharing on both a licensed and unlicensed basis. In these Comments we address two of the three distinct issues raised in the *Second FNPRM*: First, how the Commission should determine whether a Priority Access License (“PAL”) is actually in “use” for the purpose of implementing the “use-it-or-share-it” rule for opportunistic General Authorized Access (“GAA”) to PAL spectrum that is not in “use.” And

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<sup>1</sup> *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order and Second Further Notice of Proposed Rulemaking, GN Docket No. 12-354, 30 FCC Rcd 3959 (rel. Apr. 21, 2015) (“*Report and Order*” or “*Second FNPRM*”).

second, how to ensure that Fixed Satellite Service (“FSS”) sites are protected from harmful interference while leveraging the capabilities of the Spectrum Access System (“SAS”) to maximize secondary use of spectrum near FSS sites.

With respect to the determination of when PAL spectrum is in “use,” as the *FNPRM* acknowledges, OTI and PK have previously addressed this issue at length in comments and reply comments filed on behalf of the broader Public Interest Spectrum Coalition (PISC) in the proceedings leading to adoption of the *Report and Order*. We fully agree with the Commission’s finding that “permitting opportunistic access to unused Priority Access channels would maximize the flexibility and utility of the 3.5 GHz Band for the widest range of potential users” and “ensure that the band will be in consistent and productive use.”<sup>2</sup>

The Commission should authorize opportunistic access to unused PAL spectrum by defining actual “use” along two dimensions: *geography and time*. The Commission has the opportunity to leverage the capability of the SAS – using information reported to the SAS under the rules already adopted – to dynamically determine *where* and *when* the licensed spectrum is in actual use. PAL holders are required to report the basic operational characteristics of each and every Citizens Broadband Radio Service Device (“CBSD”) to the SAS at the time the CBSD is registered, and to immediately update the SAS if any parameter changes, in order to protect federal and other incumbents, for channel assignments, and other purposes. Similarly, the CBSDs regularly contact the SAS and provide (or could provide) basic information on whether they are currently (or recently) actively transmitting. The Commission should take advantage of the capabilities of the SAS and require that the PAL protection areas (*where*) and active usage (*when*) are each consistently and objectively determined on a dynamic basis by the SAS.

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<sup>2</sup> *Id.* at 3983 ¶ 72.

Allowing the SAS to calculate the protection areas is consistent, objective and also imposes no added reporting “burden” on PAL operators. The location and basic operational characteristics of each and every CBSD needed to make the calculation (e.g., accurate geolocation, conducted power levels, height above average terrain, antenna type) is already required to be reported to the SAS as part of the CBSD registration process – and updated if there is any change (e.g., in location or EIRP).

With respect to protecting incumbent FSS sites from harmful interference, OTI and PK urge the Commission to authorize the SAS to customize protection zones for each FSS site based on real-world conditions, such as terrain, CBSD operating parameters and earth station pointing angles, rather than rely on any sort of generic exclusion zones or protection criteria based on worst-case assumptions. OTI and PK suggest the Commission further leverage the capabilities of the SAS to monitor and calculate the aggregate level of interference to FSS sites on a dynamic basis, rather than define exclusion zones based on worst-case assumptions about the density of simultaneous PAL and GAA transmissions.

**I. THE COMMISSION SHOULD ADOPT AN ENGINEERING DEFINITION OF ACTUAL “USE” AND REQUIRE THE SPECTRUM ACCESS SYSTEM TO CALCULATE PROTECTION AREAS CONSISTENTLY BASED ON THE OPERATIONAL SPECIFICATIONS OF EACH REGISTERED CBSD**

Since the *Report and Order*’s stated goal in adopting a use-it-or-share-it rule is to “ensure that the band will be in consistent and productive use,”<sup>3</sup> the Commission should authorize opportunistic access to unused PAL spectrum by defining actual “use” along two dimensions: ***geography and time***. The Commission has the opportunity to leverage the capability of the SAS – using information reported under the rules to the SAS – to dynamically determine *where* and

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<sup>3</sup> *Id.*

when the licensed spectrum is in actual use. PAL holders are already required to report the basic operational characteristics of each and every CBSD to the SAS at the time the CBSD is registered (and to immediately update that information if it changes) in order to protect federal and other incumbents, for channel assignments, and other purposes. Similarly, the CBSDs regularly contact the SAS and provide (or could provide) basic information on whether they are currently (or recently) actively transmitting. OTI and PK strongly believe that the public interest is best served if the Commission takes advantage of the capabilities of the SAS and requires that the PAL protection areas (*where*) and active usage (*when*) are each consistently and objectively determined on a dynamic basis by the SAS.

Allowing the SAS to manage GAA use of partial license areas is particularly important because the Commission decided to adopt PAL areas that 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.

**Where:** OTI and PK support an engineering definition of actual “use” that, as the *Report and Order* puts it, “effectively leverag[es] the SAS to define a boundary that would forbid GAA access near Priority Access CBSDs.”<sup>4</sup> The Commission can best promote consistency, accountability and spectrum efficiency by requiring that the neutral SAS administrators certified by the agency make this calculation by applying a standardized algorithm to the geolocation and basic operational parameters that are reported for each CBSD as part of the required registration process.

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<sup>4</sup> *Report and Order* at 4081 ¶ 419.

The SAS will have all the basic information it needs to protect a CBSD when it is put into actual service and is actually in “use.” The *Report and Order* “require[s] that as part of registration, the CBSD should provide the SAS with a number of operational parameters, including geographic location, antenna height above ground level (meters), CBSD operational category (Category A/Category B), requested authorization status, unique FCC identification number, user contact information, air interface technology, unique serial number, and additional information on its deployment profile (e.g., indoor/outdoor operation).”<sup>5</sup> The rules adopted in the *Report and Order* requires additional technical specifications at registration for Category B CBSDs, including “antenna gain, antenna beam width, antenna azimuth for sector site, and antenna height above ground level.”<sup>6</sup>

The *Report and Order* further provides that “[i]f any of the required registration information changes, the CBSD shall update the SAS within 60 seconds of such change.” In addition, recognizing that accurate reporting of CBSD operational characteristics is critical, the *Report and Order* requires that “[a]ll information provided by the CBSD to the SAS must be true, complete, correct, and made in good faith, and failure to provide such information will void the user’s authority to operate the CBSD.”<sup>7</sup>

Requiring the SAS to use this verified registration data – and any updates – to generate the protection areas ensures consistency and accountability, since the Commission will have easy access to the underlying data reported for each CBSD. This approach also avoids imposing any added burden on PAL holders, who would otherwise need to calculate and report protection areas to the SAS – an added burden that could easily result in inconsistent, unreliable or out-of-date polygons enforced by the SAS, depending on the verification and enforcement measures

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<sup>5</sup> *Id.* at 4032 ¶ 232; § 96.39(c).

<sup>6</sup> *Id.* at 4032 ¶ 233; § 96.45(d).

<sup>7</sup> *Id.* at 4032 ¶ 232; § 96.39(c).

adopted by the Commission. Even if some additional technical specification is needed to make the SAS calculation more accurate, by the time a PAL operator has registered the CBSD and is ready to commence commercial service, it will obviously have the required information readily at hand as part of the process of preparing link budgets, deploying base stations and conducting site activation and commissioning tests prior to commencing commercial service.

**When:** Priority Access licensees should always have exclusive access to a 10 megahertz channel of spectrum when and where they will actually use it. As carriers have observed, this “actual use” could occur prior to the commencement of actual commercial operation. For example, a PAL holder will typically conduct pre-operational testing, or might decide in certain locations to use the spectrum for a purpose that does not operate 24/7 (e.g., for point-to-point backhaul during business hours, or for network offload during peak hours). In all of these situations – and many others we cannot foresee – the PAL spectrum normally used by a deployed and registered CBSD may not be in “actual use” for substantial periods of time. If the SAS can determine those fallow time periods – and manage opportunistic GAA use on a temporary basis – the Commission’s goal of more intensive and widely available use of the band will be advanced.

OTI and PK therefore recommend that in addition to defining “actual use” on a geographic basis, the Commission should leverage the planned capability of the SAS to also define “actual use” in temporal terms. As the *FNPRM* notes, the Wireless Internet Service Providers Association (WISPA) has already proposed an apparently workable way to do this that imposes no costly burdens or risks on PAL operators. WISPA proposes that “any CBSD that has not received 300 end-user packets within each five-minute interval would be deemed by the SAS

to not ‘in use.’”<sup>8</sup> A WISPA Technical Paper stated that “the SAS can differentiate between [CBSDs] that are handling actual, real-world customer traffic and [CBSDs] that are simply ‘idling’ and not serving real, end-user needs.”<sup>9</sup> Since the CBSD is required to be in contact with the SAS on a regular basis (either directly, or through a network proxy that aggregates CBSD information for the SAS), an objective temporal dimension to the Commission’s definition of actual “use” seems feasible and would impose no extra burden on PAL operators.

In addition to incorporating the time dimension in the definition of actual use, OTI and PK believe that each individual PAL operator should have the responsibility to affirmatively notify the SAS (through a simple online web portal, presumably) when its actual operations initially need to preclude opportunistic GAA use of bandwidth in a specified area. The Commission should allow PA licensees to notify the SAS in advance that they will need to occupy the channel for testing or other purposes on a particular date (or range of dates). In this respect, it is imperative that the Commission clearly define “actual use” so that PAL holders are not able to use pre-deployment testing, or any other temporary use, to permanently foreclose opportunistic and non-harmful GAA access to unused spectrum.

Moreover, the Commission should *not require* PAL holders to provide the SAS with notification that they have commenced actual service, 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

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<sup>8</sup> *Second FNPRM* at 4082 ¶ 420, citing Comments of WISPA, *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, FCC 14-49, at 17 (rel. April 23, 2014) (“*First FNPRM*”).

<sup>9</sup> Jack Unger, “Desired Technical Aspects of the SAS System,” GN Docket No. 12-354, at 5 (Jan. 3, 2014) (“WISPA Technical Paper”). The WISPA analysis notes further that “[t]he management or system administration database of virtually all modern wireless equipment collects statistics about traffic levels such as the number of packets exchanged and the number of connected devices.” *Ibid.*

spectrum until one of the SAS administrators receives a notification from the licensee – a process that should be made easy through an online portal.

**Economic Definition of ‘Use’:** OTI and PK believe that, on balance, the economic approach to defining actual “use” is not in the public interest. The proposal by MIT economist William Lehr, summarized in the *Second FNPRM*,<sup>10</sup> amounts to a blank check for warehousing spectrum, contrary to the Commission’s stated goal of facilitating intensive use by “the widest range of potential users.”<sup>11</sup> It is also completely unnecessary, since the proposed rules establish out-of-band emission limits sufficient to protect neighboring PALs. Maintaining fallow PAL spectrum as a guard band inside a PAL area is also unnecessary under the rules adopted in the *Report and Order*. The SAS is already required to authorize requested GAA operations on unused spectrum in a PAL area only to the extent this would not cause harmful interference with actual PAL operations, as discussed just above.

More generally, giving PAL holders the option to pay to keep spectrum fallow is directly contradictory to the animating spirit of the three-tier, Citizen’s Broadband Radio Service framework, which is the admonition in the 2012 report of the President’s Council of Advisors on Science and Technology (PCAST) that “[t]he essential element of this new Federal spectrum architecture is that the norm for spectrum use should be sharing, not exclusivity.”<sup>12</sup> Although most exclusive-use mobile spectrum is intensively used, creating a precedent that payments for non-use trump actual use of this public resource by the general public is not a public policy shift that OTI and PK can support.

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<sup>10</sup> *Second FNPRM* at 4083 ¶ 425.

<sup>11</sup> *Report and Order* at 3983 ¶ 72.

<sup>12</sup> *Report to the President: Realizing The Full Potential of Government-held Spectrum To Spur Economic Growth*, Executive Office of the President, President’s Council of Advisors on Science and Technology, at vi (July 2012).



OTI and PK acknowledge that the Lehr proposal has one very attractive feature, which is that a 50/50 split between initial auction payments and an option “strike” price could encourage PA licensees to initially see if they can operate effectively without excluding GAA users from sharing their licensed spectrum. It’s entirely possible that firms will acquire PALs as a sort of ‘insurance policy’ against the possibility that GAA spectrum won’t deliver the quality of service they need for their business model. They may find that in practice, GAA spectrum works well enough, without the added expense of purchasing a license. Since the SAS will be coordinating users to minimize interference – and the band presumably won’t be congested in most places, at least not initially – the incentive *not* to trigger exclusivity (by paying the “strike” price) is a positive one. Nevertheless, OTI and PK continue to believe that on balance an engineering definition of “use” that reflects both geographic and temporal dimensions – and is determined and enforced objectively by the SAS – is the most promising path to opening the maximum amount of 3.5 GHz small cell spectrum for opportunistic access by GAA users.

## **II. THE COMMISSION SHOULD AUTHORIZE THE SAS TO CUSTOMIZE INTERFERENCE PROTECTION ZONES FOR FSS SITES BASED ON REAL-WORLD CRITERIA AND A GOAL OF MAXIMIZING ACCESS TO FALLOW SPECTRUM CAPACITY**

The Commission correctly concluded in the *Report and Order* that the 150 km circular protection zone around licensed FSS earth stations in the 3650-3700 MHz band relies on “a one-size-fits-all approach to protecting incumbent FSS sites” and results in exclusion zones that are “excessively large, overly simplistic, and inefficient given the capabilities of the SAS to predict realistic path loss.”<sup>13</sup> Although OTI and PK expect that the technical expertise available to the Wireless Innovation Forum’s multi-stakeholder group process will provide reliable answers to

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<sup>13</sup> *Report and Order* at ¶ 72.

the implementation questions raised in the *Second FNPRM*, our groups are able to offer a few general principles that we believe should guide the Commission's final decisions on how best to implement rules that balance the protection of incumbent FSS sites with the goal of maximizing the utilization of Citizens Broadband Radio Service spectrum by the American people.

First, OTI and PK urge the Commission to authorize the SAS to customize protection zones for each FSS site based on real-world conditions, such as terrain, CBSD operating parameters and earth station pointing angles, rather than rely on any sort of generic exclusion zones or protection criteria based on worst-case assumptions. Any initial over-protection of FSS sites, whether for technical or political reasons, would be a tremendous waste of spectrum capacity that could threaten the long-term viability of the unique CBRS framework. One great advantage of the SAS as a FCC-certified and automated enforcement mechanism is that if minimal protection zones generated using real-world conditions fail to adequately protect a particular FSS site, the SAS can implement a fix that will immediately prevent any PAL or GAA device from operating in a place or manner that continues to cause harmful interference.

Second, OTI and PK suggest the Commission further leverage the capabilities of the SAS to monitor and calculate the aggregate level of interference to FSS sites on a dynamic basis, rather than define exclusion zones based on worst-case assumptions about the density of simultaneous PAL and GAA transmissions. Incumbent FSS operations should be protected from the potential aggregate interference caused by multiple low-power devices operating in proximity to their sites. However, this does not mean that the power levels, height or other technical parameters of CBSDs necessarily need to be constrained so long as the SAS is able to monitor and put an appropriate limit on the density of use when aggregate interference reaches a harmful threshold.

Finally, OTI and PK encourage the Commission to establish a baseline propagation model for out-of-band emissions, while also allowing SAS providers and equipment providers incentives to develop more accurate and efficient propagation modeling methods. Allowing SAS providers to differentiate themselves by offering more sophisticated modeling techniques would encourage competition among providers to improve their spectrum availability calculations, thereby improving utilization of the band in general. In addition, OTI and PK agree with the Commission's observation in the *Second FNPRM* that "market incentives may . . . encourage industry to deploy radios with improved (lower) adjacent channel emissions and thereby have greater access to spectrum."<sup>14</sup>

Respectfully Submitted,

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<sup>14</sup> *Second FNPRM* at ¶ 425.