

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

In the Matter of	)	
	)	
Amendment of Part 90 of the Commission's	)	WP Docket No. 07-100
Rules	)	
	)	

**COMMENTS OF FEDERATED WIRELESS, INC.**

Federated Wireless, Inc. (“Federated Wireless”) offers these comments in response to the Sixth Further Notice of Proposed Rulemaking (“6th FNPRM”) issued by the Federal Communications Commission (“Commission”) in the above-captioned proceeding.<sup>1</sup>

The 6<sup>th</sup> FNPRM seeks comment on several alternatives to stimulate expanded use of and investment in the 4940-4990 MHz band (“4.9 GHz band”). The Commission’s stated goal is to ensure public safety continues to have priority in the band while opening up the band to additional users that will facilitate increased and more efficient usage of scarce spectrum resources, and encourage a robust market for equipment and innovation.<sup>2</sup> The Commission specifically noted that “*with an appropriate sharing mechanism in place... our proposed approach will promote more opportunistic use of the 4.9 GHz band without compromising the integrity and security of public safety operations.*”<sup>3</sup> Federated Wireless believes that goal can best be met through dynamic spectrum sharing within the band and urges the Commission to implement such sharing. We believe that after a thorough assessment, the Commission will find that only through dynamic spectrum sharing can it meet all its stated goals to expand usage and maximize efficient use of the underutilized 4.9 GHz band, stimulate the

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<sup>1</sup> *Amendment of Part 90 of the Commission’s Rules*, WP Docket No. 07-100, 6<sup>th</sup> Further Notice of Proposed Rulemaking, FCC 18-33 (rel. Mar. 23, 2018) (6<sup>th</sup> FNPRM).

<sup>2</sup> See 6<sup>th</sup> FNPRM at ¶3.

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

equipment market, and ensure that public safety continues to reap the benefits of access to this 50 megahertz of spectrum by protecting existing systems and providing opportunities for new systems and new capabilities in the band.

Among various options for the 4.9 GHz band, the Commission seeks comment on the feasibility of a two-tiered sharing approach, in which Tier 1 would consist of primary licensees in the band (including all incumbent users), while Tier 2 would allow other non-public safety commercial and institutional users to access the band on a secondary basis. The Commission seeks comment on potential mechanisms that could facilitate two-tiered sharing in the 4.9 GHz band while protecting primary users.<sup>4</sup> For example, the Commission seeks comment on whether real time frequency coordination using digital identification and geo-location for Tier 2 users is feasible. The Commission also seeks comment on the feasibility of developing an automated database system to enable dynamic sharing. The Commission asks what capabilities such a database must have, what it would cost to design and build, and who should pay for it. Also, the Commission asks how the communication would work between devices and a database.<sup>5</sup> Building on the successful dynamic spectrum sharing regimes that the Commission has implemented using white space devices in the TV and 600 MHz bands and the three-tiered sharing scheme being implemented in the 3.5 GHz band,<sup>6</sup> Federated Wireless believes that a privately developed and operated dynamic spectrum

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<sup>4</sup> *Id.* at ¶83.

<sup>5</sup> *Id.* at ¶¶83-84.

<sup>6</sup> The Commission implemented rules that allow unlicensed white space devices to share spectrum in the TV band and the 600 MHz band. These white space devices must incorporate a geolocation capability and check a database for a list of available channels for their location prior to operating to ensure that primary allocated services are protected. *See* 47 C.F.R. Part 15, Subpart H. In the 3550-3700 MHz band, the Commission expanded upon the white space concept by implementing a three-tiered sharing regime in the Citizens Band Radio Service (“CBRS”). CBRS devices may only operate pursuant to instructions from a real-time dynamic spectrum sharing database – the Spectrum Access System (“SAS”) - which manages interference among users by assigning channels and power levels for devices while also monitoring the spectrum to protect incumbent users first, then  
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sharing database is the only solution that will ensure real-time interference protection for Tier 1 users while maximizing spectrum usage by allowing additional users to also access the spectrum to provide their important services (which are often public safety related). Such a sharing regime is the most efficient, most economical, and lowest risk option for the Commission because the model for such a system already exists and can be quickly, easily, and inexpensively adapted for this application, while fulfilling each of the Commission's stated goals for the band.

**I. THE COMMISSION SHOULD ADOPT A SHARED USE MODEL FOR THE 4.9 GHZ BAND TO ACCOMPLISH THE COMMISSIONS STATED GOAL OF PROMOTING MORE OPPORTUNISTIC USE OF THE 4.9 GHZ BAND.**

In his statement upon adoption of the 6<sup>th</sup> FNPRM, Chairman Pai said he believes that the Commission will unleash the potential of this band by, among other things, opening the door to more spectrum sharing.<sup>7</sup> Indeed, the Commission has tried many approaches since designating the 4.9 GHz band for public safety use in 2003- fifteen years ago. Despite years of efforts by the Commission to encourage greater use and investment in the band, a dearth of equipment and lack of widespread use from the public safety community, continues to render the band largely underutilized.<sup>8</sup> The stagnation in the 4.9 GHz band stands in stark contrast to other spectrum bands in which usage is increasing exponentially and the Commission is working at breakneck speed to

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Protected Access Licensees ("PAL") and finally provide for use by General Assigned Access users ("GAA"). *See* 47 C.F.R. Part 96.

<sup>7</sup> *See* Statement of Chairman Ajit Pai to 6<sup>th</sup> FNPRM.

<sup>8</sup> Since designating the 4.9 GHz band for public safety use in 2003, the Commission has made several changes to the band in an effort to stimulate more intense usage. For example, in 2009 the Commission modified the rules to permit fixed point-to-point operations on a co-primary basis and in subsequent years issued further proposals to increase use of the band. *See, e.g.,* The 4.9 GHz Band Transferred from Federal Government Use, WT Docket No. 00-32, *Memorandum Opinion and Order and Third Report and Order*, 18 FCC Rcd. 9152 (2003) and Amendment of Part 90 of the Commission's Rules, WP Docket No. 07-100, *Report and Order and Further Notice of Proposed Rulemaking*, 24 FCC Rcd 4298 (2009). Despite the Commission's efforts, as of July 2, 2018, there are only 3275 licenses issued for the 4.9 GHz band.

provide access to support existing broadband services and provide opportunities for new services and applications. This urgent need for new spectrum is particularly pronounced for commercial providers seeking access to valuable mid-band spectrum, such as the 4.9 GHz spectrum, with its unique combination of favorable propagation characteristics and high-capacity. The industry is focused on using mid-band spectrum to enhance 4G LTE technology and implement new 5G technology. With the growing need for additional high-capacity spectrum, maximizing efficient use of the 4.9 GHz band is more important than ever.

Congress shares the Commission's and industry's focus on ensuring that the nation's limited spectrum resources are put to their best uses. This is evidenced by the recent MOBILE NOW Act, which directs the Commission and the National Telecommunications and Information Administration ("NTIA") to, among other things, identify 55 megahertz of spectrum below 6 GHz for use on either a licensed or unlicensed basis, or a combination of licensed and unlicensed.<sup>9</sup> This Congressional requirement can largely be satisfied by providing expanded access to the 50 megahertz of the 4940-4990 MHz band through dynamic spectrum sharing.<sup>10</sup>

***Dynamic spectrum sharing is becoming widely accepted.***

Dynamic spectrum sharing is gaining widespread acceptance by both commercial and federal government users, including the Department of Defense ("DoD") which operates critical systems vital to ensuring the safety of the United States, and presents the best option for achieving the

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<sup>9</sup> See MOBILE NOW Act, Sec. 603. The MOBILE NOW Act was enacted as Title VI, Consolidated Appropriations Act, 2018, P.L. 115-141, Division P, the Repack Airwaves Yielding Better Access for Users of Modern Services (RAY BAUM'S) Act.

<sup>10</sup> The MOBILE NOW Act requires that at least 255 megahertz of Federal and non-Federal spectrum be identified for mobile and fixed wireless broadband use. Of that 255 megahertz, 100 megahertz below 8000 megahertz must be identified for use on an unlicensed basis and 100 megahertz below 6000 megahertz must be identified on an exclusive, licensed basis for commercial mobile use. The only requirements on the remaining 55 megahertz is that it be identified from frequencies below 8000 megahertz and for use on either a licensed or unlicensed basis, or a combination of licensed and unlicensed. *Id.*

Commission's goal of promoting and maximizing use of the 4.9 GHz band without risk of interference to incumbent users. NTIA Administrator and Assistant Secretary of Commerce for Communications and Information, David Redl, recently said that new and dynamic access techniques and technologies continue to offer a lot of promise for spectrum sharing and specifically that the 3.5 GHz sharing model demonstrates that dynamic sharing can enable access while still protecting sensitive information and eliminating harmful interference.<sup>11</sup> Surely, if DoD is comfortable relying on dynamic sharing techniques to allow safe and reliable sharing of national security-critical spectrum resources and the federal government is looking for additional sharing opportunities, the greater public safety community can have confidence that dynamic spectrum sharing will also work for it. In fact, APCO, in its 4.9 GHz Task Force Report ("APCO Report") stated that, "*[a]n innovative approach that incorporates essential features [sic] such as frequency coordination, with newer spectrum management tools that could expand the user base while preserving reliable access for public safety, may be the most appropriate path for fully unleashing all of the potential of the 4.9 GHz band.*"<sup>12</sup> APCO added that in the interest of promoting the protection of life and property while making maximum use of the band, the Commission should encourage sharing arrangements and cooperative work by a new coordination process in conjunction with development efforts by the vendor community, or by some other innovative approach, including by development of software to determine priority and pre-emption.<sup>13</sup> There is widespread agreement that newer spectrum management techniques such as dynamic sharing will lead to more intense use of the 4.9 GHz band which will, in turn, benefit public

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<sup>11</sup> See Remarks of Assistant Secretary Redl at the NTIA Spectrum Policy Symposium, Jun. 12, 2018 at: <https://www.ntia.doc.gov/speechtestimony/2018/remarks-assistant-secretary-redl-ntia-spectrum-policy-symposium>.

<sup>12</sup> APCO International 4.9 GHz Task Force Report, WP Docket No. 07-100, PS Docket No. 06-229, WT Docket No. 06-150, at 15 (dated Sept. 28, 2015) ("APCO Report").

<sup>13</sup> *Id.*

safety users by spurring the commercial development of a wider variety of equipment and helping to lower equipment costs.

Dynamic shared spectrum is already well understood and, as evidenced by current activities in the 3.5 GHz band and the remarks of Assistant Secretary Redl, is becoming more readily recognized for its capabilities to effectuate enhanced spectrum usage and protect users from harmful interference. The work being done to make the CBRS band a reality can be leveraged and adapted to the 4.9 GHz band to quickly and efficiently expand usage of the band to additional users. The CBRS SAS administrators along with numerous partners have been conducting pre-commercial trials for quite some time.<sup>14</sup> And the SASs are expected to soon begin extensive bench and real-world testing as part of the SAS certification process. As further evidence of the sophistication of dynamic spectrum sharing, many of the CBRS SAS administrators are also deploying an environmental sensing capability (“ESC”) to monitor the spectrum for Navy radar signals and instruct devices accordingly to prevent harmful interference. These ESCs will also soon begin a certification process. The Commission and SAS Administrators have learned to efficiently deploy dynamic spectrum sharing through the processes and procedures developed and adopted by the Commission and the standards developed by WinnForum. The same processes used for the CBRS roll-out can be used for the 4.9 GHz band and can be implemented on a much shorter timescale. As a further streamlining measure, the Commission could provide a minimalist 4.9 GHz band certification/testing process for SAS’s that are already approved for the CBRS band. The progress

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<sup>14</sup> See, e.g., Baumgartner, Jeff, “Verizon Touts CBRS Trial on Live Network,” Multichannel News (May 15, 2018), at: <https://www.multichannel.com/news/verizon-touts-cbrs-trial-live-network>; “An Up-Close Look at Charter’s Network Operations and 3.5 GHz Trials in Tampa,” Charter Communications Policy Blog (May 4, 2018), at: <https://policy.charter.com/blog/close-look-charters-network-operations-3-5-ghz-trials-tampa/>; Allevan, Monica, “Telrad, Federated Wireless strike multiyear CBRS deal,” FierceWireless (Jan 18, 2018), at: <https://www.fiercewireless.com/wireless/telrad-federated-wireless-strike-multi-year-cbrs-deal>.

and potential demonstrated by the CBRS band leads to only one conclusion: dynamic spectrum sharing can be successfully deployed in the 4.9 GHz band.

***Dynamic spectrum sharing is a better solution than the other possibilities advanced by the Commission.***

Dynamic spectrum sharing is a superior solution to the other options the Commission laid out in the 6<sup>th</sup> FNPRM. In the 6<sup>th</sup> FNPRM, the Commission is also seeking comment on whether to: (1) provide critical infrastructure industry (CII) users co-primary status with public safety and allow CII entities immediate access to two five-megahertz channels;<sup>15</sup> (2) allow public safety licensees that have obtained exclusive spectrum rights in the 4.9 GHz band to lease spectrum capacity to CII or to commercial entities generally;<sup>16</sup> or (3) redesignate the band, wholly or partially, to support commercial wireless use.<sup>17</sup>

While there has been widespread support for expanding eligibility in the band to CII entities, none of these options can match dynamic spectrum sharing in maximizing efficient use of the band in a short timeframe. The first option would put CII entities on equal footing with public safety in terms of band status but would generally limit such usage to only two five-megahertz channels for three years. Usage beyond those two channels could only be attained after navigating a notice and comment period.<sup>18</sup> In contrast, dynamic spectrum sharing would make the band's entire fifty megahertz available for CII entities immediately, so long as stations comply with the Commission's technical rules for avoiding causing harmful interference to public safety users. Given the light usage by public safety users, limiting CII entities to only twenty percent of the spectrum or

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<sup>15</sup> See 6<sup>th</sup> FNPRM at ¶¶66-73.

<sup>16</sup> *Id.* at ¶¶75-79.

<sup>17</sup> *Id.* at ¶¶85-86.

<sup>18</sup> *Id.* at ¶¶66 and 72.

subjecting them to a potentially lengthy and burdensome administrative process to gain access to fallow spectrum does not meet the Commission's goals as it would continue to leave much of the band underutilized for a significant period of time and is not in the public interest.

Similarly, the option of allowing public safety agencies to lease spectrum to CII or other commercial entities would make public safety agencies that have no existing mechanisms for spectrum leasing, or experience negotiating or managing spectrum lease deals, responsible for these transactions. In practice, such an arrangement would result in an inconsistent, inefficient, and administratively burdensome patchwork of leasing processes managed by agencies that are not equipped for such functions. Furthermore, there is no evidence that even if the Commission expanded access to such leasing, that such action would lead to any significant expanded use of the band. The Commission has permitted leasing between public safety entities or to entities that support public safety since 2003, but since such those rules were adopted there does not appear to be a single lease on record in the Commission's Universal Licensing System ("ULS") in the 4.9 GHz band.<sup>19</sup> Dynamic spectrum sharing does not present the same barriers that entities would face through a leasing program. Namely, entities can take advantage of real-time coordination to gain access to the 4.9 GHz band without diverting scarce resources to staffing, funding, and managing a lease program that will only benefit a few users, if any at all.

Finally, the Commission seeks comment on simply redesignating the band for widespread commercial use either on a licensed or unlicensed basis. Such redesignation would come at the expense of either reducing spectrum access for mission critical communications, continued spectrum usage inefficiency or reduced interference protection for users. Rather than redesignating

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<sup>19</sup> A review of the ULS on July 2, 2018 shows that of the 3275 active licenses in the 4940-4990 GHz band, not a single one indicates that it was subject to a lease agreement. Similarly, a search for lease applications does not show any past lease applications or current pending lease applications.



the 4.9 GHz band for exclusive commercial use, the Commission should maximize efficient use of the band by permitting shared access for commercial providers on an equal basis with other non-public safety entities through dynamic spectrum sharing. Under a dynamic spectrum sharing approach, major carriers can utilize the 4.9 GHz mid-band spectrum on an as needed basis without unduly limiting public safety use of the band.<sup>20</sup> Such an approach will provide commercial providers another option for supplementing their core networks to alleviate congestion while continuing to provide for key public safety and CII needs. In sum, the Commission can quickly and efficiently ensure that the 4.9 GHz band is used to its maximum efficiency by adopting rules to provide dynamic spectrum sharing throughout the 4.9 GHz band.

Dynamic spectrum sharing provides opportunities for all users regardless of whether they provide communications services or use the spectrum for private internal use to conduct their business more efficiently and avoids all drawbacks of the Commission's other options by quickly and efficiently ensuring that spectrum is used to its maximum efficiency. Using proven real-time coordination techniques to assign and direct operating parameters, dynamic sharing databases ensure that communications related uses and applications deliver their benefits and entities are protected as dictated by the rules. Federated Wireless urges the Commission to implement dynamic spectrum sharing within the 4.9 GHz band to benefit public safety and CII users as well as other users that can make use of the band.

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<sup>20</sup> Most of the major carriers as well as other entities have stated their interest to use the dynamically in the CBRS band to provide service to subscribers to alleviate congestion when their core networks are operating under high load conditions; the same can be done in the 4.9 GHz band. *See, e.g.*, Dano, Mike. "Verizon, T-Mobile, Sprint join AT&T in eyeing LTE deployments in 3.5 GHz CBRS band" FierceWireless, March 1, 2017 at: <https://www.fiercewireless.com/tech/verizon-t-mobile-sprint-join-at-t-eyeing-lte-deployments-3-5-ghz-cbrs-band>. We note that, like the CBRS band, the 4.9 GHz band can be used with any existing licensed band as well as new bands that the Commission makes available in the low-, mid-, or high bands on an exclusive licensed basis to provide additional capacity when needed.

***Dynamic spectrum sharing eliminates complexity and leads to efficient band management.***

In examining the 6<sup>th</sup> FNPRM, the Commission has been very thorough in laying out a band plan and technical and service rules to manage the band while providing for expanded use. While basic technical rules would still be necessary, such as a channel plan, power limits, and emission limits, implementing dynamic spectrum sharing would render many of the other proposals moot and greatly simplify management of the band. The dynamic spectrum database can assess band usage in real-time and assign channels to users for various use cases based on the types of communications they need (e.g., wide-area coverage, point-to-point or multipoint links, or even aeronautical or robotic usage). Such assignments can be made to protect incumbent public safety communications and other communications subject to any hierarchical rules the Commission may impose.

In implementing dynamic sharing in the 4.9 GHz band, the Commission and public safety community can continue to use many of the same coordination processes that they have relied upon to date. Dynamic sharing will simply enhance the effectiveness of such processes and provide an additional valuable tool. For example, Federated Wireless sees benefit in continuing the regional planning process to ensure regional and local input for determining planning parameters and protocols. The dynamic spectrum database is agnostic to the planning parameters and only needs to know the assignment and usage protocols for each regional area. These are then programmed into the database and enforced accordingly with no further action needed on the part of the licensee.

With respect to frequency coordinators, however, because the database handles the spectrum assignment in real-time on an as needed basis, prior frequency coordination would not be needed. Thus, the Commission's question regarding whether frequency coordinators should be required to be certified public safety coordinators also becomes a moot point as such coordinators are not necessary to the process. Prior coordination is static in nature, confers no additional benefits and

imposes hurdles and costs. Thus, the Commission need not expend resources to certify public safety frequency coordinators for the 4.9 GHz band.

Similarly, we believe that Public safety concerns over interference are misplaced. As extensive testing of CBRS has shown, dynamic sharing databases are capable of enforcing a priority access regime while coordinating thousands of simultaneous connections without harmful interference occurring. Because public safety users can be classified with Tier 1 priority status (and because a dynamic spectrum controller can enforce priority access for public safety networks by classifying users) there is virtually zero threat that first responders and others will not be able to access the spectrum interference free when needed. Indeed, the Navy and other DoD users have extensively vetted dynamic spectrum sharing and concluded that it does not present a material risk of interference to mission critical operations. Any other outcome would be unacceptable.

**II. A SHARED USE MODEL FOR THE 4.9 GHZ BAND CAN BE IMPLEMENTED MORE QUICKLY AND WITH LITTLE TO NO DISRUPTION TO INCUMBENT USERS COMPARED TO THE OTHER OPTIONS IDENTIFIED BY THE COMMISSION.**

Dynamic shared spectrum access is the only solution that maximizes usage of the band with the least disruption to the incumbent users. Through a dynamic shared access regime, incumbent public safety users could remain on their currently licensed channels and new users could be assigned around them such that harmful interference is avoided. Priority tiers can be custom tailored by entity, geography, or any other parameter as determined by the Commission in cooperation with public safety and the industry. Thus, critical public safety functions would experience little to no impact and would continue unabated as new users are provided access to the band. This stands in stark contrast to the disruption that would ensue should the Commission redesignate the band for commercial use and force public safety incumbents to undergo a costly and time-consuming relocation to another band or purchase new equipment and enter into subscription plans with commercial providers. Such disruption would prove particularly troublesome as public

safety entities often operate across jurisdictions or provide mutual aid in areas which do not necessarily follow Commission-imposed service area boundaries. In such a case, a public safety entity could find itself lacking service at a critical time due to redesignation-related disruptions. Continuing public safety operations in the 4.9 GHz band while expanding access to other users avoids operational changes and relocation expenses for incumbents while allowing optionality for new users seeking to operate in the band. Such an approach preserves limited resources for incumbent users' primary mission – providing safety to the public.

Further, dynamic sharing will more quickly maximize use of the band by avoiding the time-consuming process of planning for and conducting an auction. As demonstrated by the CBRS implementation, enabling dynamic spectrum sharing technology is faster than traditional auctions. The Commission adopted the initial CBRS rules in 2015, and it is now widely expected that limited commercial launch could take place as soon as the fourth quarter of 2018, only three years later. Today the dynamic sharing model is even more fully developed and the Commission and industry have the benefit of the lessons learned in the CBRS development process. It is reasonable to expect that the 4.9 GHz dynamic sharing launch could be completed even faster.

Moreover, implementing dynamic spectrum sharing means that incumbents do not have to endure the laborious and time-consuming process of waiting for relocation to be completed and new users can enter the band expeditiously. And as already stated, dynamic spectrum sharing has the benefit of eliminating the need for prior coordination because the database would handle those functions. In fact, new users such as CII providers will be able to access and use any available spectrum, up to and including the entire band, subject only to ensuring that higher tier public safety users have access when and where needed. This feature of dynamic spectrum access again demonstrates the efficiency of real-time spectrum sharing over prior coordinated use. In addition, spectrum can be made available as soon as spectrum access database administrators pass the

necessary certification tests administered by the Commission; a process that can be greatly accelerated from the current CBRS certification process as the Commission has gained extensive experience which can be used to streamline the database approval procedures.

### **III. A THREE TIERED DYNAMIC SHARING APPROACH IS THE MOST SENSIBLE MODEL FOR THE 4.9 GHZ BAND.**

The 6<sup>th</sup> FNPRM proposes a two tier sharing approach, but Federated Wireless believes the benefits adding a third tier outweigh the relative simplicity of a two-tier approach. We believe that a three tier approach, with the third tier consisting of lower-priority general access users, will provide the usage volume and application diversity necessary to attract equipment vendors and nurture the necessary ecosystem to ensure a wide variety of equipment and lower equipment costs for all users, including public safety users. Potential users of the 4.9 GHz band have often bemoaned the lack of reasonably priced equipment and cited it as a deterrent to investment. For example, the APCO Report makes the point that the public safety user community remains small relative to the greater consumer marketplace which has historically resulted in a limited vendor ecosystem, specialized devices, and higher costs.<sup>21</sup> Expanding access to a wider base of users will better stimulate equipment development in the band to the benefit of public safety, CII entities, and other potential users of the band.

The Commission predicated its two-tier approach on Tier 1 consisting of primary licensees in the band (including all incumbent users) and Tier 2 encompassing other non-public safety users on a secondary basis.<sup>22</sup> However, the Commission did not explicitly define the users that would comprise Tier 2. We believe that use of the 4.9 GHz band would be better served by parsing out the specific users and further dividing them into Tiers 2 and 3. Consistent with the Commission's

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<sup>21</sup> See APCO Report at 12.

<sup>22</sup> See 6th FNPRM at ¶82.

approach, Tier 1 would consist of both existing incumbent public safety users and new public safety users. These users would be analogous to incumbent users in the CBRS band who enjoy full interference protection and absolute priority access to the band.<sup>23</sup>

Tiers 2 and 3 would then consist of all other eligible users of the band delineated by their relative need to spectrum for critical operations. Under our proposed approach, Tier 2 would consist of CII providers as defined in Part 90 of the Commission's rules.<sup>24</sup> The spectrum sharing database would assign resources to these users so long as the proposed usage would not cause harmful interference to Tier 1 public safety users. The third tier users would be similar to GAA in the CBRS band; these users would be licensed-by-rule and able to access any part of the spectrum when not in use and when it would not cause harmful interference to Tier 1 or Tier 2 users. Expanding eligibility in the 4.9 GHz band in this way will be attractive to a wide variety of users and will spur investment in more equipment which will in turn lower costs and assure sustainability of the band. More importantly, this expanded usage will not come at the expense of harmful interference to public safety or CII users. We note that some public safety entities have expressed concerns that more risk is created merely by allowing more users in a spectrum band. This is not the case. There is no evidence that additional users, when properly managed by a database administrator, will result in an increased risk of harmful interference to incumbent users. Further, to ensure protection of Tier 1 users, we propose that Tier 2 and Tier 3 equipment be equipped with geo-location capability and required to provide digital identification so that if, in the extremely

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<sup>23</sup> See 47 C.F.R. Part 96, Subpart B.

<sup>24</sup> 47 C.F.R. §90.7 defines Critical Infrastructure Industry (CII) as state, local government and non-government entities, including utilities, railroads, metropolitan transit systems, pipelines, private ambulances, volunteer fire departments, and not-for-profit organizations that offer emergency road services, providing private internal radio services provided these private internal radio services are used to protect safety of life, health, or property; and are not made commercially available to the public.

unlikely event there was an interference incident, the offending device could be easily found and the situation mitigated prior to any widespread harm occurring.<sup>25</sup>

We understand that public safety entities have deployed a number of point-to-point (“PTP”) and point-to-multipoint (“PTMP”) links throughout the 4.9 GHz band and that many of these links are not registered. We are aware that the presence of these unregistered links with unknown locations has led some public safety entities to conclude that it would be difficult to deploy a shared spectrum solution because the spectrum sharing database could not account for unregistered links. While we agree that should these PTP and PTMP links remain unregistered and at unknown locations dynamic sharing would be difficult, we note that all sharing whether dynamic or static would be difficult under these conditions. However, the cost and difficulty of registering these locations and updating their information in a shared database is nominal in comparison to the value created by sharing in the 4.9 GHz band.<sup>26</sup> Such costs pale in comparison to the opportunity cost of continuing to allow this band to be underutilized or compared to the costs of implementing any of the Commission’s other proposed remedies.

From a practical standpoint, dynamic spectrum sharing in the 4.9 GHz band would be functionally similar to the CBRS band. An automated spectrum database would manage spectrum

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<sup>25</sup> Because devices are controlled by the spectrum access database, once notified of an interference situation, the database can command a device to cease transmitting.

<sup>26</sup> We note that in connection with potential changes to the 3.7-4.2 GHz C-Band, the Commission recently issued a public notice to open a window for entities that own or operate existing FSS earth stations in the 3.7-4.2 GHz band to file an application to register or license the earth station if it is currently not registered or licensed, or to file an application to modify a current registration or license. *See* Temporary Freeze on Applications for New or Modified Fixed Satellite Service Earth Stations and Fixed Microwave Stations in the 3.7-4.2 GHz Band; 90-Day Window to File Applications for Earth Stations Currently Operating in 3.7-4.2 GHz Band, *Public Notice*, DA 18-398 (Rel. Apr. 19, 2019). The Satellite Industry Association (“SIA”) states that there could be over 30,000 unregistered earth stations in the C-Band. *See* SIA Reply Comments in GN Docket No. 17-183 at 18. Given that there are only 3275 licenses in the 4.9 GHz band, it is unlikely that the number of unregistered PTP or PTMP links is nearly that large.

assignments and assign power levels to devices based on a user's tier, location, and application. The database will communicate to devices through a secure communications protocol using the latest security protocols to prevent unauthorized spectrum use. In addition, the database itself will use the latest security protocols to prevent hackers from gaining access to any data. As such a system has already been designed and is being deployed in the CBRS band, a similar system could be easily deployed and operational in the 4.9 GHz band in a short timeframe. With respect to cost, Federated Wireless believes that a reasonable cost structure can be designed whereby operating expenses could be covered by user fees charged to the Tier 2 and Tier 3 users. Thus, public safety would gain access to lower cost equipment and continue to enjoy unfettered access to the spectrum to perform their important public safety functions without incurring any additional costs. Other users, particularly CII users, would gain low cost access to additional spectrum for performing their missions. This result is a win-win for all parties involved.

Finally, we recognize that public safety has an investment in existing equipment in the band that is currently not capable of communicating with a spectrum database. To ensure a smooth transition to full dynamic sharing in the band, Federated Wireless believes a modest transition period is warranted. As an initial matter, public safety entities can provide details for their spectrum usage (which channels are used, typical bandwidth, operating times, if applicable, etc.) when registering their links in the database. Consistent with the National Public Safety Telecommunications Council ("NPSTC") recommendation and the Commission's proposal for expanding use of the 4.9 GHz band to CII entities of preserving public safety licensing priority for three years, we would propose similarly that the database protect any registered link for the shorter of three years or when equipment is upgraded to be compatible with the spectrum access database system. We believe that by allowing dynamic spectrum sharing as recommended by Federated Wireless, plenty of low cost equipment will be available in a short timeframe minimizing any burden on public safety entities for



upgrading their equipment. Unlike the Commission's proposal, which requires a lengthy notice and comment period for entities to gain access to the majority of the spectrum, Federated Wireless's proposal leverages the advantages of the spectrum sharing database, which can simply assign access from day 1 on spectrum where there are no systems registered. And, in the event that harmful interference does occur, a simple mechanism can be implemented whereby public safety entities can provide relevant information and the database can be updated to prevent such occurrences from happening again.<sup>27</sup>

**IV. A ROBUST SUPPLIER ECOSYSTEM IS MORE LIKELY TO DEVELOP UNDER A DYNAMIC SPECTRUM SHARING PLATFORM AND WILL HELP ENSURE THE SUCCESS OF EFFICIENT SPECTRUM SHARING IN THE 4.9 GHZ BAND.**

Federated Wireless expects a wide range of compatible equipment to make its way to the marketplace and be readily available soon after the Commission authorizes dynamic spectrum access in the 4.9 GHz band. As a benefit of the Commission's previous well-reasoned decision to approve the use of dynamic spectrum sharing in the CBRS band, a large and robust supplier ecosystem has already developed for devices that are capable of registering with a SAS administrator. For the CBRS band alone, there are dozens of OEM suppliers already building compatible, interoperable equipment. This familiarity with dynamic spectrum sharing technology should spur rapid adoption and deployment of compatible equipment. Notably, the 4.9 GHz band is spectrally proximate to the 3.5 GHz CBRS band. We believe that the equipment being developed for CBRS can be easily modified to also work in this band, further reducing the timeframe for a large variety of dynamic spectrum sharing capable equipment at reasonable cost to become available.

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<sup>27</sup> The rules require a similar practice for CBRS. *See, e.g.*, 47 C.F.R. § 96.17(f) which provides that FSS earth station licensees in the 3600-3700 and 3700-4200 MHz bands may request additional protection from SAS Administrators to prevent harmful interference into their systems.

Further, beyond the availability of equipment, the CBRS SAS administrators are already familiar with and experienced in deploying dynamic spectrum sharing technology. The first wave of SAS administrators have already received conditional approval and expect to receive final approval (and limited commercial launch) before the end of 2018. The extensive work and experience gained in designing and developing the CBRS SASs will greatly benefit the extension of dynamic spectrum sharing to the 4.9 GHz band in that the timeframe from adoption of rules to deployment can be greatly condensed. Thus, the nation's valuable resources will quickly be put to more intensive use allowing our first responders and the CII community to better provide important services to the public.

Dynamic shared spectrum technology is no longer an "experiment." It is a well understood and well supported technology capable of permitting intense use of valuable spectrum resources while protecting the most critical communications from harmful interference. Public safety incumbents will be able to take comfort in the fact that once dynamic spectrum sharing is authorized in the 4.9 GHz band, the industry will have had ample experience operating dynamic shared spectrum in the CBRS band. That experience along with the spectrum efficiency inherent with dynamic spectrum sharing will set up the 4.9 GHz for success in the future.

## **V. CONCLUSION.**

Federated Wireless commends the Commission on its efforts to transform the 4.9 GHz band from its current underutilized state to a more robust environment capable of not only continuing to support critical public safety needs, but also provide access for CII entities and other users that have need for spectrum access. As demonstrated by our comments, we believe that the band can be put to its highest and best use by permitting all users access to the band through dynamic spectrum sharing. Dynamic spectrum sharing will permit the most intensive use of the band more quickly and more cheaply than other options. This will in turn stimulate the equipment

market to ensure that all users, including public safety users, have access to the latest equipment at reasonable prices. In doing so, mission critical public safety systems will be protected and important CII systems will have more spectrum options for serving the public. Federated Wireless urges the Commission to quickly adopt rules and implement procedures that will support these essential applications through dynamic spectrum sharing in the 4.9 GHz band. Federated Wireless stands ready to engage with the Commission and other interested parties to help the Commission achieve its primary goal of maximizing efficient use of the 4.9 GHz band.

Respectfully submitted,

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