Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Petition for Rulemaking to Amend and	)	RM-_____
Modernize Parts 25 and 101 of the	)	
Commission's Rules to Authorize and	)	
Facilitate the Deployment of Licensed Point-	)	
to-Multipoint Fixed Wireless Broadband	)	
Service in the 3700 – 4200 MHz Band	)	

To: The Commission

PETITION FOR RULEMAKING

BROADBAND ACCESS COALITION

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June 21, 2017

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Pursuant to Section 7 of the Communications Act of 1934, as amended (the "Act") and Section 1.401 of the Commission's Rules, the Broadband Access Coalition (the "Coalition")[1] submits this Petition for Rulemaking ("Petition") to amend and modernize Parts 25 and 101 of the Commission's Rules to authorize and facilitate a new, licensed fixed wireless point-to-multipoint ("P2MP") high-speed broadband service on a shared basis in the underutilized 3700 – 4200 MHz band. The rule changes proposed herein would create the only mid-band spectrum allocation authorized for licensed P2MP fixed wireless broadband service to rural, unserved and underserved areas that would enable multiple providers to offer competitive gigabit or near-gigabit service. Part 101 frequency coordination will ensure that the incumbent Fixed-Satellite Service ("FSS") and terrestrial point-to-point ("P2P") Fixed Service ("FS") will not suffer harmful interference from band-sharing with P2MP. The Petition proposes "a new technology or

[1] A full list and brief description of each Coalition member is attached hereto as Exhibit 1.

service" pursuant to Section 7 of the Act and thereby requires a finding within one year whether the proposed rules are in the public interest.[2]

I. SUMMARY

The Coalition is a diverse group of technology companies, trade associations, and non-profit public advocacy groups, and includes service providers, equipment vendors, and frequency coordinators that support the development and deployment of licensed P2MP as a new means to enable (1) affordable, high-throughput, last-mile broadband access in rural, exurban and other higher-cost areas, and (2) much-needed competition to incumbent fixed broadband providers in more densely populated areas.

The Petition advances the Commission's goals of promoting new technologies and services that can enable broadband deployment and competition, empower private investment in the digital economy, and accelerate progress towards ubiquitous broadband service. Access to a substantial amount of mid-band spectrum is urgently needed to make fixed wireless broadband available to unserved and underserved rural communities and to facilitate competition in more densely populated areas, many of which lack effective competition. The Commission's data indicates that only 42 percent of developed census blocks in the U.S. have access to more than one provider offering fixed broadband speeds of at least 25/3 Mbps, and only 12 percent of developed census blocks in the U.S. have access to more than one provider offering fixed broadband speeds of at least 100 /10 Mbps.[3] According to the Commission's *2016 Broadband*

[2] 47 U.S.C. § 157.

[3] *See* "Internet Access Services: Status as of June 30, 2016," Industry Analysis and Technology Division, Wireline Competition Bureau (April 2017) ("*2016 Internet Access Report*"), at Figure 4. Figure 4 shows

Progress Report, five percent of rural Americans lack access to fixed broadband service at even 4 /1 Mbps, six percent lack access to 10 /1 Mbps service, and 39 percent (23 million people) lack access to 25/3 Mbps service.[4] American consumers deserve better.

Fixed wireless technology is an efficient and cost-effective way for consumers to receive broadband services in their homes and at their businesses and community anchor institutions, including schools, libraries and medical facilities. Fixed wireless networks can be deployed at 25 percent or less of the capital expense of an all-fiber network, while offering comparable reliability and speeds – if there is sufficient spectrum.[5] Fixed wireless networks can be deployed quickly and are easily scalable, such that private capital can be invested in stages over time without significant upfront capital investment. Thus, the availability of spectrum for last-mile wireless connectivity is essential for the cost-effective deployment of new high-capacity broadband Internet access services, particularly in areas where the costs to deploy fiber-to-the-home ("FTTH") technology are prohibitive.

In a growing number of areas, fixed wireless technology is being combined with optical fiber to form a hybrid fiber-wireless ("HFW") architecture. In many of these areas, consumers typically lack a choice of service providers, and thus do not benefit from robust competition. Recent developments have demonstrated that deploying FTTH may not be financially feasible,

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that 58 percent of developed census blocks have access to one or fewer service providers offering broadband speeds of 25/3 Mbps and 88 percent of developed census blocks have access to one or fewer service providers offering broadband speeds of 100/10 Mbps. Further, Figure 4 *overstates* the level of competition because "a provider that reports offering service in a particular census block may not offer service, or service at that speed, to all locations in the census block." *Id*. at 6.

[4] *2016 Broadband Progress Report*, 31 FCC Rcd 699, 730 (2016).

[5] *See* Section II.B. *infra*.

except in densely populated urban areas. Even in urban areas, the costs of retrofitting multi-dwelling units can be prohibitive. Because attempts to deploy FTTH have been limited and difficult to scale, broadband providers are increasingly turning to HFW networks that rely primarily on fiber for backhaul and fixed wireless for shorter distances and last-mile access to consumers and businesses.

Although unlicensed spectrum has been an extremely important means to offer service in areas where wireline technologies are not cost-effective to deploy, there is no licensed mid-band spectrum allocated for fixed P2MP service than can enable gigabit speeds. By adopting rules consistent with this Petition, the Commission can make available a new commercial spectrum resource that will enable efficient and affordable broadband service and empower the digital economy. This "new … service" fits squarely within Section 7's criteria for expedited consideration.

The 3700 – 4200 MHz band satisfies two fundamental requirements for spectrum to provide high-speed fixed wireless broadband access to residential and small business customers and to community anchor institutions. First, the 3700 – 4200 MHz band has excellent propagation characteristics compared to high-band spectrum, offering near-line-of-sight ("nLOS") capability at low power for last-mile services. Second, the band has 500 megahertz of contiguous spectrum, an amount sufficient to accommodate twenty-five 20 megahertz channels that can be bonded to create larger 40, 80, and 160 megahertz channels. These wide channels facilitate the provision by multiple entities of last-mile fixed wireless broadband connectivity at gigabit or near-gigabit speeds.

At present, the 3700 – 4200 MHz band is extremely underutilized. Although the band is allocated on a co-primary basis to FSS space-to-Earth (receive) and FS, there has been very limited shared use in the real world. Based on a review of the Commission's Universal Licensing System ("ULS"), there are only about 118 terrestrial P2P FS stations licensed across the entire United States, primarily in a limited number of rural areas.[6]

There are fundamental flaws with the current policies that contribute to the underutilization of the band. The Commission's uncodified, and archaic, policy of permitting FSS operators to coordinate and license earth stations for "full-band, full-arc" protection massively overprotects FSS to the detriment of fixed terrestrial operations. This overprotection is exacerbated by the fact that FS applicants must coordinate around FSS earth stations listed in the Commission's database that were never built, have been abandoned, or remain authorized with incorrect locations and technical parameters.[7] The Coalition proposes to address these existing flaws by requiring FSS licensees to report accurate and current location and technical information to the Commission as a precursor to a more spectrally efficient "real-time, real-world" FSS protection scheme. This approach also will accomplish the goals proposed in the FWCC Petition by improving coordination for new P2P fixed wireless links.[8]

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[6] *See* map showing locations of licensed FS facilities at Exhibit 2 hereto. TeleVision, Inc., in its Comments filed January 8, 2017 in response to the FWCC Petition (at 5), found only 71 FS links in the 3700 – 4200 MHz band in its ULS database search in May 2015.

[7] *See* Section III.A. *infra*.

[8] *See* Fixed Wireless Communications Coalition, Inc., Petition for Rulemaking, Request for Modified Coordination Procedures in Bands Shared Between the Fixed Service and the Fixed Satellite Service Petition for Rulemaking, RM-11778 (filed Oct. 11, 2016) ("FWCC Petition").

The Coalition proposes to amend and modernize Parts 25 and 101 of the Commission's Rules to enable deployment of high-capacity licensed P2MP services in a more spectrally efficient fashion, while protecting FSS and FS incumbents from harmful interference. The Coalition's request to add low-power licensed P2MP service would create a third service in the band as in addition to, not in lieu of, FSS operations under existing Part 25 rules and FS operations under existing Part 101 rules. Coordination will ensure spectrally efficient co-existence among all three services.

Building on the pending FWCC Petition that seeks only to make P2P use more viable,[9] this Petition proposes a new P2MP service under a new Subpart K to Part 101 to authorize and enable last-mile broadband access, with the ability of licensees to bond channels to create sufficient bandwidth for gigabit wireless performance.

The 3700 – 4200 MHz band is not now, and will not for several years, be suitable for mobile use given the existing deployment of FSS earth stations and FS P2P links. The future possibility of using portions of the band for sharing between P2MP and mobile services should not, in any way, be allowed to delay immediate allocation for and use of the band by P2MP services.

For a number of reasons, the 3700 – 4200 MHz band can be made available for shared, licensed P2MP broadband deployment rapidly and simply:

- There are no federal government allocations in the band.
- Incumbent FSS and FS operations will continue to be protected from harmful interference.

[9] *See* FWCC Petition. The Coalition requests that the docket in RM-11778 be consolidated into the docket of this proceeding.

- New FSS earth stations and P2P fixed microwave links also will be protected from harmful interference.

- The current frequency coordination regime will remain unchanged, pending transition to an automated frequency coordination system.

- No new allocations are required either globally or in the United States.

- No sophisticated sharing mechanisms are required.

In sum, the new service proposed in the Petition can be implemented quickly without complication and without harming incumbents, for the benefit of those living on the wrong side of the digital divide and others who lack broadband access choice.

II. The Petition Advances Important Public Interest Objectives

A. The Petition Advances Congressional Interest In Stimulating Broadband Deployment

Congress has recognized that additional spectrum below 6 GHz is required for consumers to have access to much-needed wireless broadband services. For example, the 2012 Spectrum Act authorized the Commission to conduct an incentive auction to re-purpose television channels for wireless use.[10] More recently, the bipartisan MOBILE NOW Act, reintroduced by Senators John Thune (R-S.D.) and Bill Nelson (D-Fla.) on January 3, 2017, and reported out of the Senate Commerce Committee without opposition, states that:

> Consistent with the Presidential Memorandum of June 28, 2010, entitled "Unleashing the Wireless Broadband Revolution" and establishing a goal of making a total of 500 MHz of Federal and non-Federal spectrum available on a licensed or unlicensed basis for wireless broadband use by 2020, not later than

[10] The Public Safety and Spectrum Act ("2012 Spectrum Act") is Title VI of the Middle Class Tax Relief and Job Creation Act of 2012 (P.L) 112-92). The authority for reverse auctions is in Section 6402, 126 STAT. 224.

> December 31, 2020, … *NTIA, and the Commission shall make available … at least 255 MHz of … spectrum below [6 GHz] for mobile and fixed broadband use*.[11]

The MOBILE NOW Act text further provides that:

> the Commission shall submit … a report evaluating the feasibility of allowing commercial wireless services, licensed or unlicensed, to share use of the frequencies between 3700 megahertz and 4200 megahertz.[12]

Although Congress' objective in making more mid-band spectrum available is clear, it is not necessary for the Commission to await passage of the MOBILE NOW Act and prepare a sharing feasibility report in order to begin the process of authorizing the 3700 – 4200 MHz band for licensed fixed P2MP use. Instead, the Commission can and should immediately consider the Coalition's comprehensive, concrete plan to enable deployment in the near term. Moving forward at this time will accelerate the objectives of the bipartisan MOBILE NOW Act, whether or not it is ultimately enacted.

Further, the Gigabit Opportunity Act ("GO Act") introduced by Sen. Shelley Moore Capito (R-W.Va.) in the Senate and Rep. Doug Collins (R-Ga.) in the House of Representatives would, if enacted in its proposed form, provide financial incentives to companies investing in gigabit service to designated low-income and rural communities. The bill is technology-neutral and specifically identifies providers using fixed wireless technology as eligible recipients of GO Act benefits. Like the MOBILE NOW Act, the GO Act illustrates strong Congressional interest in promoting better broadband service to rural and unserved areas.

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[11] MOBILE NOW Act, S. 19, 115th Congress, 1st Session, Sec. 3(a)(1) (emphasis added).

[12] MOBILE NOW Act, Sec. 5(b).

B. Additional Spectrum For Point-To-Multipoint Services Will Help Bridge The Digital Divide

In the *2016 Broadband Progress Report*, the Commission found that approximately 10 percent of the population – 34 million Americans – lack access to broadband speeds of 25/3 Mbps, and that 39 percent of the population in rural areas – more than 23 million Americans – lack such access.[13] On Tribal lands, approximately 41 percent lack access to 25/3 Mbps broadband service, and 68 percent in rural Tribal lands lack such access.[14] Our nation's schools and libraries face a similar connectivity gap. Over 40 percent of schools and 47 percent of students do not receive broadband services that meet the Commission's short-term goal of 100 Mbps per 1,000 users.[15]

In addressing the need to make more spectrum commercially available, then-Commissioner Pai stated that:

> [I]t could be years before consumers see the benefits of the [Citizens Broadband Radio Service] rulemaking. In the meantime, we must redouble our efforts to free up additional spectrum for immediate consumer use ….[16]

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[13] *See 2016 Broadband Progress Report* at 731.

[14] *See id.* at 732.

[15] *Id.* at 741.

[16] Commissioner Pai was specifically focused on the 5 GHz band ("the most obvious place to look is the 5 GHz band"). *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550–3650 MHz Band*, Report and Order and Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959 (2015) ("*CBRS First Order*"), Statement of Commissioner Ajit Pai Approving in Part and Concurring in Part. Subsequently, NTIA announced that commercial sharing of the 5350 – 5470 MHz band was off the table. *See* Remarks of Lawrence E. Strickling, Assistant Secretary of Commerce for Communications and Information, The 5G Wireless Future and the Role of the Federal Government, Hudson Institute, Washington, D.C. (Dec. 16, 2016) ("For the 5350-5475 MHz band …, we had to evaluate whether unlicensed devices could operate without degrading the performance of critical federal radars. Unfortunately, the methodical analysis we conducted in collaboration with federal agencies, the FCC and industry led us to conclude that there is no feasible path forward today to share the 5.3 GHz band").

Similarly, Commissioner O'Rielly stated that:

> Beyond the [millimeter wave] bands, the Commission needs to look even further and target additional bandwidth between 6 and 24 GHz *and even in lower bands*. The Commission must do so in the near term as well.[17]

Modernizing the Parts 25 and 101 rules to enable licensed P2MP deployment would be fully consistent with these objectives, as well as Chairman Pai's "Digital Empowerment Agenda," which seeks to remove regulatory barriers to broadband deployment and eliminate the digital divide that exists most prominently in rural areas.[18] As then-Commissioner Pai observed when he unveiled that plan, "there are still far too many parts of this country where broadband is unaffordable, inadequate, or nonexistent -- where it's harder to start a business, improve one's life, build a community."[19] Citing a 2015 university study, a recent *Wall Street Journal* article concluded that "[r]ural counties with more households connected to broadband had higher incomes and lower unemployment than those with fewer…."[20] Making additional spectrum available for licensed P2MP deployment on a nationwide basis will help "ease the path for the private sector to deploy next-generation broadband networks in their communities."[21] Stated

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[17] *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Notice of Proposed Rulemaking, 30 FCC Rcd 11878 (2015), Statement of Commissioner Michael O'Rielly Approving in Part and Dissenting in Part (emphasis added).

[18] *See* "A Digital Empowerment Agenda," Remarks of FCC Commissioner Ajit Pai at The Brandery, Cincinnati, Ohio (rel. Sept. 13, 2016).

[19] *Id.* at 2.

[20] Moving at the Speed of Dial-Up, Jennifer Levitz and Valerie Bauerlein, *Wall Street Journal*, June 16, 2017 at A1.

[21] Summary of Commissioner Ajit Pai's Digital Empowerment Agenda (rel. Sept. 13, 2016).

another way, as a recent report correctly recognized, "[s]pectrum is in a sense a type of infrastructure: Congressional desire to expand broadband deployment should include efforts to provide additional spectrum for commercial uses through a variety of license types."[22]

Last-mile wireless connectivity is essential for the cost-effective deployment of new broadband Internet access services. Fixed wireless technology is rapidly improving and remains the most cost-effective means to deliver fixed broadband services to consumers in rural areas where sparse population density prohibits ubiquitous wireline deployment. In addition, market experience demonstrates that deployment of FTTH may not be financially feasible, except in high-density, typically urban core areas.[23] Fiber deployment costs vary widely based on company, local ordinances, access to rights-of-way, and engineering and competitive complexities stemming from particular local conditions (*e.g.*, existing conduit, direct burial, and aerial on existing utility poles). One estimate puts the cost of FTTH deployment, for the industry generally, at $800 to $3,000 per subscriber in urban and suburban areas.[24] Another estimate puts

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[22] Brake, Doug, "A Policymaker's Guide to Rural Broadband Infrastructure," Information Technology & Innovation Foundation (April 2017) at 7.

[23] *See, e.g.*, Google Curbs Expansion of Fiber Optic Network, Cutting Jobs, New York Times, Oct. 25, 2016, http://www.nytimes.com/2016/10/26/technology/google-curbs-expansion-of-fiber-optic-network-cutting-jobs.html?_r=0, ("In June [2016], Google Fiber announced that it was acquiring Webpass, a company that beams high-speed internet into apartment buildings using a fiber-connected antenna. This and other wireless technologies provide a quicker and less expensive way to expand access to faster web speeds").

[24] Reality Check: Using Fixed Wireless to Expand Broadband Internet, Jaime Fink, Chief Product Officer and Co-Founder, Mimosa (Aug. 2, 2016), *available at* http://www.rcrwireless.com/20160802/opinion/reality-check-using-fixed-wireless-expand-broadband-internet-tag10 (last visited May 9, 2017).

the typical cost of FTTH deployment at $1,200 to more than $4,000 per home.[25] The cost can be even higher in rural areas. Some Coalition members estimate that nearly half the cost of FTTH deployment is attributable to the final short connection directly to the home.

By contrast, fixed wireless P2MP service can be deployed for a much lower cost per home served, in both suburban and rural areas. If providers were able to utilize a sufficient amount of contiguous mid-band spectrum, they would be able to offer faster speeds while maintaining similar deployment costs, resulting in more affordable, accessible, and robust broadband service.

C. Additional Spectrum Will Foster Broadband Competition

In communities with a high-speed fixed broadband provider, consumers can benefit from more competitive alternatives to the services provided by the incumbent local exchange carrier and/or cable service provider. A 2016 study by the Analysis Group found that increased competition in broadband markets – measured as the entry of gigabit internet service, additional providers, or higher-speed plans than are currently offered – has a meaningful effect on prices and capacity upgrades by incumbent providers.[26] The study found that:

- The presence of gigabit service in a Designated Market Area (DMA) is associated with a $27 per month decrease (25 percent) in the average monthly price of broadband plans with speeds greater than 100 Mbps and less than 1 Gbps.

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[25] Financing FTTH deployment: Show us the ROI for Fiber to the Home, David Hashman, President, Knowledge Works LLC, http://searchtelecom.techtarget.com/tip/Financing-FTTH-deployment-Show-us-the-ROI-for-Fiber-to-the-Home (last visited May 2, 2017).

[26] Dan Mahoney and Greg Rafert, "Broadband Competition Helps to Drive Lower Prices and Faster Download Speeds for U.S. Residential Consumers," Analysis Group (Nov. 2016) at 1, available at http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/broadband_competition_report_november_2016.pdf.

- The presence of a gigabit service is associated with a $13 to $18 (14 to 19 percent) monthly price decline for broadband plans with download speeds that range from 25 Mbps to less than 1 Gbps.

- If a DMA moves from having one to two providers of gigabit Internet download speed, "the standard monthly price for gigabit internet will decline by approximately $57 to $62, which is equal to a reduction in price of between 34 and 37 percent."

- Capacity upgrades are also more likely. The study found that the "availability of high-speed plans in a DMA increases the likelihood that other providers will introduce high-speed plans to match the speeds being offered by their competitors."[27]

Of course, the Commission's own data shows that too many Americans lack any real choice among high-speed fixed broadband providers. The Commission's most recent *Internet Access Services* report, based on data through June 2016, shows that in 21 percent of developed census blocks for broadband, there are no broadband providers offering service at the Commission's 25/3 Mbps throughput standard, and there is only one provider offering 25/3 Mbps service in 37 percent of developed census blocks.[28] Approximately 51 percent of census blocks have no 100/10 Mbps broadband service available at all and only 12 percent of census blocks have competing options at that speed or higher. With appropriate technical rules and a sufficient amount of 3700 – 4200 MHz spectrum, over time the Coalition expects symmetrical 100/100 Mbps service to be a standard offering among licensed P2MP providers.

Consumers need alternatives to the fixed broadband service provided by incumbent wireline providers. A high-capacity, fixed wireless P2MP service using spectrum with wide channels and good propagation would enable providers to offer highly competitive and affordable fixed wireless broadband and HFW service. In order to enter more densely populated

[27] *Id.*

[28] *See 2016 Internet Access Report* at Figure 4.

markets already served by an incumbent broadband provider, new providers must often aggressively price their services. These economics make it challenging to build a competitive FTTH system. However, the availability of suitable licensed spectrum to provide last-mile wireless access with high throughput and at lower cost changes the economics such that competitive fixed wireless and HFW networks can be deployed and service offered at affordable prices, with less need for governmental monetary support and financial incentives.

In addition to fostering competition to incumbent broadband providers, the rules proposed in this Petition will enable multiple P2MP licensees in the same area to acquire up to 160 megahertz of spectrum. This will incentivize each licensee to expedite deployment, compete with each other, and offer innovative and affordable broadband service.

III. The 3700 – 4200 MHz Band Is Ideally Suited For Licensed P2MP Fixed Wireless Broadband Service

A. The 3700 – 4200 MHz Band Is Extremely Underutilized

Use of the 3700 – 4200 MHz band today is highly inefficient. Fixed service in the 3700 – 4200 MHz band historically has been limited to high-power, long-haul P2P links operating in a few locations. The existing "full-band, full-arc" coordination policy adopted in the 1960s for FSS earth stations has sharply limited FS deployments.[29] As FWCC correctly observes in its Petition, "[l]arge amounts of spectrum shared by the Fixed Service (FS) and the Fixed Satellite Service (FSS) go needlessly unused" and full-band, full-arc coordination by FSS "violates core principles of spectrum management and policies against warehousing,"[30]

Furthermore, FSS C-band license and renewal applications have declined steadily since at least 1988. Applications for new licenses have declined from a peak of about 463 in 1999 to 90 or fewer in all but one year from 1998 – 2009, and to 37 or fewer in each year since 2010.[31] New earth station registrations have also steadily declined and license renewals have trended downward.[32] The declining use of the band for FSS suggests that the rules and policies governing the 3700 – 4200 MHz band are outdated and badly in need of review.

Over this same time period, spectrum sharing techniques have improved dramatically. Since 2003, the 70/80/90 GHz bands have been shared by non-Federal and Federal operators on

[29] *See* FWCC Petition at 6-7.

[30] *Id.* at 1-2.

[31] *See* Exhibit 3.

[32] *See id.*

a non-exclusive and co-primary basis using a "light licensing" registration system and third-party database management that simultaneously facilitates open access, protects fixed P2P links from harmful interference, and coordinates with NTIA to ensure there is no harmful interference to Federal users.[33] Similarly, in 2005, the Commission adopted "light licensing" rules for the 3650 – 3700 MHz band in which nationwide, non-exclusive licensees are required to protect grandfathered FSS earth stations and encouraged to design their facilities to avoid interference with locations previously registered in ULS, and to coordinate and cooperate with other licensees if interference arises.[34] Building on these registration sharing regimes, the Commission authorized private databases to protect incumbent TV broadcast stations and to enable unlicensed use of vacant TV channels.[35] More recently, the Commission adopted rules for the Citizens Broadband Radio Service ("CBRS") that establish a three-tiered spectrum access hierarchy to protect Federal and commercial incumbents (including FSS earth stations), assign exclusive licenses, and allow general authorized access on a "license by rule" basis, for both fixed and mobile users.[36] None of these sharing methods was even contemplated, let alone available, when the co-primary FSS/FS regime was established decades ago for the 3700 – 4200 MHz band.

The declining use of the band, innovation in spectrum sharing and spectrum management, and exploding consumer demand for high-capacity broadband access suggest that this

[33] *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, 18 FCC Rcd 23318 (2003); 47 CFR § 101.1501, *et seq*.

[34] *See Wireless Operations in the 3650-3700 MHz Band*, 20 FCC Rcd 6502 (2005).

[35] *See Unlicensed Operations in the TV Broadcast Bands*, 21 FCC Rcd 12266 (2006); *Unlicensed Operations in the TV Broadcast Bands*, 23 FCC Rcd 16807 (2008).

[36] *See CBRS First Order*.

underutilized spectrum resource can and should be put to better use. The Petition seeks to accomplish these objectives simply and soon.

B. The Propagation Characteristics And Amount Of Contiguous Spectrum At 3700 – 4200 MHz Enable Reliable, High-Throughput P2MP Fixed Wireless Broadband Service

The 3700 – 4200 MHz band satisfies two fundamental requirements for spectrum to provide fixed wireless broadband access to residential and small business customers:

- Propagation: The spectrum must provide nLOS capabilities within a reasonable radius.
- Capacity: The availability of 500 megahertz of contiguous spectrum can enable multiple providers to deliver gigabit and near-gigabit broadband access.

First, the 3700 – 4200 MHz band provides the requisite propagation characteristics: it is not susceptible to rain fade and it offers nLOS capability. In rural areas where consumers lack access to fixed broadband service and access to high-site transmission areas is limited, large areas can be served with less infrastructure and less cost, making fixed wireless broadband service more affordable for providers to deploy and for consumers to purchase. In suburban residential areas, where over 50 percent of the U.S. population resides, mitigating foliage and line-of-sight constraints is necessary to broadly deliver reliable fixed wireless broadband service. Due to favorable propagation characteristics, fixed wireless Internet service providers ("WISPs") have long relied on unlicensed and "lightly-licensed" sub-6 GHz band spectrum to deliver fixed broadband services. But heavy use of the 2.4 GHz, 3.65 GHz and 5 GHz bands by broadband providers, increasing consumer demand for high-bandwidth services, and the presence of millions of unlicensed Wi-Fi and other devices inject congestion in network use. Such

congestion can result in greater interference, decreased reliability, and reduced data throughput.[37] As broadband consumption increases, this problem will worsen.

Second, the 3700 – 4200 MHz band offers a sufficient amount of contiguous spectrum to operate up to three 160-megahertz channels, or a larger number of smaller channels. With new technological advances, including innovations in massive multiple-input, multiple-output ("MIMO"), adaptive beamforming, and spectrum re-use techniques, making available 500 megahertz of spectrum below 6 GHz could enable multiple competitors to provide gigabit or near-gigabit service to subscribers at an affordable price That capacity could be used to cover longer distances for rural broadband service; address suburban short-range applications in more densely populated areas using last-mile fixed wireless, instead of exclusively using fiber optics, to create an optimal HFW system; and allow increased availability of broadband choices in urban multi-dwelling units.

[37] Although the Commission has authorized 100 megahertz of additional priority-licensed spectrum in the CBRS band, this band is shared with mobile and other categories of operators that are expected to have substantial interest in the band.

C. The 3700 – 4200 MHz Band Can Be Expeditiously Modernized

The 3700 – 4200 MHz band can be modernized easily and quickly. The band already is used for commercial purposes and does not need to be transferred from or shared with Federal government users. There are no ground-based or coastal Federal users to protect, and thus no need for sophisticated hierarchical sharing methods or exclusion zones to protect sensitive military uses. The band is already allocated for FS, and therefore, no change to Part 2 of the Commission's Rules is necessary to expand fixed use to include P2MP.[38] Frequency coordination processes and the ULS and IBFS databases are already in place.

Not only can the rules be amended in short order, but intensive P2MP use can begin very soon after the rules are effective. Development of equipment will benefit from equipment being used in the adjacent 3650 - 3700 MHz band. The existing Part 101 frequency coordination processes can easily incorporate the addition of P2MP at this time while implementation of the proposed upgrade to more automated coordination procedures is developed. Although a new service will be authorized, the fundamental aspects of the equipment and technology ecosystem and frequency coordination structures are already in place.

IV. The Petition Qualifies For Consideration Under Section 7 Of The Act

Section 7 of the Act states as follows:

> (a) It shall be the policy of the United States to encourage the provision of new technologies and services to the public. Any person or party (other than the Commission) who opposes a new technology or service proposed to be permitted under this chapter shall have the burden to demonstrate that such proposal is inconsistent with the public interest.

[38] *See* 47 CFR § 2.106 (allocating the 3700 – 4200 MHz band to FS and FSS – space-to-Earth for non-Federal uses). There are no allocations of the 3700 – 4200 MHz band for Federal users.

> (b) The Commission shall determine whether any new technology or service proposed in a petition or application is in the public interest within one year after such petition or application is filed. If the Commission initiates its own proceeding for a new technology or service, such proceeding shall be completed within 12 months after it is initiated.

The Petition proposes a "new service," encompassing the following novel attributes:

- Operations in mid-band spectrum available for ***licensed*** fixed P2MP use;
- Rules that can enable providers to deploy last-mile fixed wireless broadband service at gigabit speeds;
- Spectrum sharing among three classes of fixed users – FSS, P2P and new P2MP service licensees – that will protect incumbents while not requiring relocation of Federal or commercial incumbents; and
- Over time, an automated frequency coordination process developed by a multi-stakeholder group that will more efficiently coordinate shared operations in the band.

Any one of these four attributes could, standing alone, be deemed a "new technology or service." But taken together, the case is clear: the Petition builds on new technology, new spectrum management techniques and, over time, a new automated Part 101 frequency coordination mechanism to convert 500 megahertz of underutilized spectrum into a regulatory structure that can enable gigabit fixed wireless broadband service that is unique and clearly needed in large parts of the country.

In addition, the proposed rule changes can be adopted in short order, and within the one-year time frame codified in Section 7(b) of the Act. Chairman Pai spoke in March 2017 about reinvigorating Section 7.

> "Starting today, we are going to breathe life into Section 7 of the Communications Act – or maybe the proper metaphor would be to add teeth."
>
> ***

> "Unfortunately, the FCC hasn't enforced Section 7. When someone proposes a new technology or service, we don't make a concerted effort to say yes or no within a year. Indeed, the FCC rarely mentions Section 7, let alone abides by it. But that changes now. Today, I am directing agency staff to follow Section 7."[39]

As described above, this Petition proposes a "new . . . service," enabled by new technology, that squarely fits within the criteria of Section 7 and Chairman Pai's vision of how that statute should be applied.

V. Modernizing Part 25 Will Maximize Sharing Of The 3700 – 4200 MHz Band

A. The Commission Should Apply Policies That Do Not Overprotect FSS Operations

The antiquated and uncodified policies governing the licensing of FSS earth stations have severely limited deployment of terrestrial FS links. FSS providers are permitted to coordinate and license – and thus, receive interference protection for – "full band, full arc" operations.[40] That is, FSS earth stations are routinely licensed to use all 500 megahertz of the 3700 – 4200 MHz band, even though any given earth station typically uses only a small portion of the band.

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[39] "Bringing the Benefits of the Digital Age to All Americans," Remarks of FCC Chairman Ajit Pai at Carnegie Mellon University's Software Engineering Institute, March 15, 2017 at 7. *See also* "The First 100 Days: Bringing the Benefits of the Digital Age to All Americans," Remarks of FCC Chairman Ajit Pai at the American Enterprise Institute, May 5, 2017 at 4 ("we want to help American entrepreneurs bring big ideas to life. That's why we've put in place a process to implement Section 7 of the Communications Act, a long-neglected law. Going forward, if an innovator files a petition … for approval of a new technology or service, we will make a decision within one year. There will be no more waiting indefinitely for an answer").

[40] By stark contrast, Canadian earth stations seeking to coordinate with terrestrial FS stations in the United States provide more detailed information, including the specific transmit and receive frequencies, the antenna azimuth and elevation angles, and the orbital location of the satellite. As set forth below, the Coalition requests that FSS operators provide the same information to IBFS. *See, e.g.,* Public Notice, Request for Coordination of Canadian Earth Stations with USA Terrestrial Fixed Stations, Report No. SPB-268, (rel. March 29, 2017).

Many earth stations access only a single satellite transponder, and the bandwidth of each transponder is typically 36 megahertz.[41]

For example, a review of the IBFS database found approximately 975 C-band receive-only earth stations licensed to the Associated Press ("AP"). In a random sampling undertaken by the Coalition, each license reviewed was authorized for the full 3700 – 4200 MHz of spectrum. However, AP's web site indicates that it is using only 23 megahertz for each of these earth stations.[42] Stated differently, these 975 earth stations, spread across the United States, are protected for receive operations across 500 megahertz of spectrum despite the fact that they use only 23 megahertz of spectrum, all of which is between 3700 and 3800 MHz.

In addition, FSS earth stations are routinely licensed to communicate with any Permitted Space Station List satellite, which provides interference protection for the earth station in any direction toward the geostationary arc. However, most earth stations only communicate with one orbital slot for most, if not all, of their 15-year license terms.

The coordination and licensing of FSS earth stations for "full band, full arc" operations largely precludes the coordination and licensing of subsequent terrestrial microwave links.

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[41] "Full band, full arc" licensing is also inconsistent with Section 25.203(a), which requires that "[s]ites and frequencies for earth stations … operating in frequency bands shared with equal rights between terrestrial and space services, shall be selected, to the extent practicable, in areas where the surrounding terrain and existing frequency usage are such as to minimize the possibility of harmful interference between the sharing services."

[42] http://www.aptn.com/80256FE4003BCAD4/(httpInfoFiles)/E500E97631AB492E802571A9004810B6/$file/APs_Satellite_Network.pdf (last visited May 2, 2017). More precisely, it appears that AP uses transponders on two different satellites that cover the United States. On the Intelsat 34 satellite, AP operates in a 23 megahertz channel at approximately 3748 – 3771 MHz. On the SES-2 satellite, AP operates in a 23 megahertz channel at approximately 3875 – 3898 MHz. In all cases, AP does not operate between 3800 and 4200 MHz.

Without knowing the specific frequency band being used, and the direction in which the earth station is facing, terrestrial fixed operations must protect each and every FSS earth station across all 500 megahertz and in all possible directions toward the geostationary arc. This results in extraordinarily large areas where, for all intents and purposes, new deployments of terrestrial fixed services are precluded throughout the band.

There is overwhelming evidence that many of the licensed FSS earth stations were never built, no longer exist, or operate at locations far removed from those for which they were licensed. These "ghost" earth stations further exacerbate the preclusive effect of "full band, full arc" coordination and licensing. The Coalition used Google Earth imagery to review the status of 4,724 registered FSS earth stations. In 1,371 cases – 29 percent of the total – no earth station antenna was found within 1.6 kilometers of the registered coordinates. Similarly, in a random survey of 300 C-band earth stations in the IBFS database, FWCC found that 27 percent of registered earth stations were never built or were subsequently decommissioned, and another 37.7 percent of earth stations were located more than 100 feet from their licensed coordinates.[43] The 15-year license term awarded to FSS earth stations exacerbates the database inaccuracies because FSS licensees have no incentive to update the IBFS database.

The Coalition is not the first to recognize the fundamental flaws in the coordination and licensing of FSS earth stations. In its Petition, FWCC identifies a significant problem: "[l]arge

[43] FWCC Letter to FCC, Request for an Audit of Licensed Satellite Earth Stations in Bands Shared with the Terrestrial Fixed Service, Sept. 30, 2016 at 3. FWCC has requested an audit of FSS earth stations in June 2002, February 2004, November 2008, and September 2016. *See id.* at 1-2 and n. 2.

amounts of spectrum shared by the [FS] and [FSS] go needlessly unused."[44] FWCC observes that "full band, full arc" coordination for FSS operations "violates core principles of spectrum management and policies against warehousing.[45] FWCC notes that, unlike FSS operators, FS operators are "permitted to coordinate only the frequencies and azimuths [they] will actually use …."[46] The end result, according to FWCC, is that:

> [i]n the 3.7 – 4.2 GHz downlink band, registered earth stations are so numerous as to make any FS coordination impossible in most of the country. Yet many of these earth stations each access just one transponder on one satellite.[47]

The Coalition proposes specific rule and policy changes that will maximize sharing of the 3700 – 4200 MHz band among FSS, P2P, and P2MP services. The Coalition emphasizes that the proposed rule modifications are designed to maximize sharing of the band while simultaneously protecting incumbent FSS and FS operations. The Coalition does not seek to displace existing licensed and operating FSS operations or FS operations from the band.

B. The Commission Should Require FSS Licensees To Update Their Operating Parameters

As a first step, the Coalition urges the Commission to require FSS licensees in the 3700 – 4200 MHz band to update the IBFS database as soon as possible so the Commission can determine which earth station licenses should remain in effect and which should be automatically

[44] FWCC Petition at 1.

[45] *Id.* at 2.

[46] *Id.* at 4.

[47] *Id.* at 5.

terminated for non-operation. Such action would comply with Section 25.161(c) of the rules, which provides that:

> A station authorization shall be automatically terminated … without further notice to the licensee upon:
>
> (c) The removal or modification of the facilities which render the station not operational for more than 90 days ….

To ensure continued compliance with Section 25.161(c), the Coalition proposes that the Commission require FSS operators to certify that their operations comply with Section 25.161(c), and to annually certify continuing database accuracy. The Coalition further proposes that the licensees of the remaining operating earth stations provide, on a one-time basis and if and when any further changes are made, limited additional information – specifically, the frequencies used and the orbital slot being accessed.[48] The Coalition also proposes that FSS licensees specifically be required, under Section 25.161(c), to provide updates within 90 days of any subsequent de-commissioning of an earth station. Further, the Coalition proposes that FSS licensees be required to update the IBFS database when making changes to the operating frequencies and/or orbital slot being accessed.[49] Interference protection would be based on the licensees' specific spectrum use and operating parameters.

[48] By specifying the correct geographical coordinates and the orbital slot being accessed, the elevation angle and azimuth of the earth station can be readily derived.

[49] The Commission has adopted similar updating and reporting obligations for FSS in the 3550-3650 MHz band. *See Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550–3650 MHz Band*, Order on Reconsideration and Second Report and Order, 31 FCC Rcd 5011 (2016) (adopting Section 96.17).

C. Cooperation With FSS Operators

The Coalition recognizes that FSS operators have expressed concern, in comments filed in response to the FWCC Petition, that elimination of "full band, full arc" coordination and licensing could impact the ability of certain FSS operators to change the frequency band in which they are operating or the satellite with which they are communicating.[50] The Coalition is confident that such changes can be accommodated without retaining the overprotective "full band, full arc" coordination policies. To advance this objective and the benefits proposed in this Petition, the conditions under which FSS licensees would be permitted to change the frequency or orbital slot of their communications should be limited to circumstances when such a change is necessary. The Coalition commits to work with the FSS C-band industry to define the circumstances when changes in frequency and/or orbital slot communications will be necessary and to refine the procedures that will implement the changes so that actual FSS operations can be adequately protected.

VI. Modernizing Part 101 Will Enable Rapid Deployment Of Licensed P2MP Fixed Wireless Broadband Service

The Coalition proposes to add a new Subpart K to Part 101 to prescribe rules enabling the deployment of licensed P2MP fixed wireless broadband service. The existing Part 101 rules were designed for P2P links, typically operating from towers, building rooftops, hills or mountains. The Coalition does not propose any rule changes that would alter the technical rules in a manner that would increase the burdens on FS stations. Many of the basic rules set forth in

[50] *See, e.g.*, Satellite Industry Association, Petition to Dismiss or Deny, RM-11778 (filed Jan. 9, 2017); SES Americom, Petition to Dismiss or Deny, RM-11778 (filed Jan. 9, 2017); Intelsat License LLC, Opposition, RM-11778 (filed Jan. 9, 2017); and Letter from EchoStar/Hughes, RM-11778 (filed Jan. 9, 2017).

Subparts A – F would also apply to the licensed P2MP service, although several narrowly tailored changes will be required.

The proposed rules will continue to protect FSS and FS incumbents from harmful interference. The Coalition emphasizes that it does not seek to extend the Part 96 CBRS regime into the 3700 – 4200 MHz band, and that an SAS for sharing among fixed users is unnecessary. The Coalition also notes that no changes to international treaty obligations are required to adopt these modifications.

A. Proposed Changes To Part 101, Subparts A - F

Licensed P2MP fixed wireless service is essential to deploying cost-effective fixed broadband and HFW networks. Part 101 should be expanded to include P2MP fixed wireless broadband service on a shared basis with existing FSS and FS.

As currently written, Section 101.101 authorizes the following operations in the 3700 – 4200 MHz band:

- Common Carrier Fixed Point-to-Point Microwave Service
- Local Television Transmission Service
- Private Operational Fixed Point-to-Point Microwave Service
- Fixed Satellite Service

Consistent with the Petition, the following service should be added to this list:

- Point-to-Multipoint Fixed Broadband Service

B. Proposed Rules For A New Subpart K To Part 101

Part 101 currently authorizes P2P, but does not include rules for P2MP. Because P2MP will be a new licensed service that will co-exist with other P2P services, it is appropriate to establish a new subpart within Part 101.

1. Coordination, Registration, And Licensing Requirements

The current rules for FS frequency coordination, registration, and licensing are not a good fit for P2MP service, and thus, several new rules are needed. First, the rules should codify an expedited coordination process (notification and response) to be undertaken by electronic communications. Ultimately, the existing coordination procedures should be replaced by an automated process based on FSS, P2P and P2MP industry standards on protection criteria that would be developed by a multi-stakeholder group.

Second, the Coalition proposes that applicants for licensed P2MP service be required to coordinate self-selected access points at specified geographic locations, plus a specified maximum number of client devices to be deployed within the site-based and frequency coordinated service area within the specified distance of the access point. If an applicant cannot successfully coordinate a geographic service area or seeks to deploy a client device outside its frequency coordinated geographic service area, the applicant would be permitted to coordinate client devices on a path-by-path basis. There should not be any FCC application or licensing fee for client devices.

The maximum EIRP for access point and client devices would be specified, along with the antenna characteristics. However, unlike the specific requirements under existing Part 101.115, new Subpart K would allow the licensee freedom to choose from a range of antennas

that meet the minimum performance requirements for access points and client devices. For sectorized antennas, the licensee would be required to specify the gain; azimuth; polarization; height; azimuth and elevation half-power beamwidths; the center of the beam in heading (0 – 359 degrees); and tilt (*e.g.*, -10 degrees). For omni-directional antennas, the licensee would be required to specify the gain, height and any electrical tilt.

Frequency coordinators will develop an interference profile based upon the access point and an array of future client devices placed throughout the site-based, frequency coordinated service area.[51] Potential interference with FSS earth stations will be analyzed to include all man-made obstructions (*e.g.*, buildings, walls, berms), as well as topographic obstructions (*e.g.*, mountains and hills).

Upon successful completion of the coordination process, the ULS entry shall reflect the geographic coordinates of the access point, the frequency range, power and antenna characteristics, the service area limits, the maximum number of future authorized client devices, and the power and antenna characteristics of client devices. Only upon completion of coordination shall the operator be permitted to apply for a Part 101 P2MP license.

P2MP licensees would be permitted to install and operate client devices within the site-specific, frequency coordinated service area without further coordination. This process would eliminate the uncertainty, delay and high cost of individual coordination of each client device. Service providers seeking to offer licensed P2MP systems must have the flexibility to install and

[51] This interference profile, and the parameters taken into account in the coordination process, would also apply to site-specific client devices.

operate client devices wherever the customer is located within the site-specific, frequency coordinated service area, subject, of course, to the coordination parameters.

The Coalition emphasizes that coordination in the 3700 – 4200 MHz band will be far simpler than the spectrum management approach the Commission adopted for the CBRS band where the Commission adopted rules and a methodology for protecting Federal shipborne and ground-based radar systems, enabled both fixed and mobile use, and established two categories of base stations. By contrast, existing FSS and FS stations and proposed P2MP services in the 3700 – 4200 MHz band will all transmit from fixed points to other fixed points.

2. Power Limits And Maximum Sector Radius

Existing Sections 101.113 and 101.143(b) provide for P2P power limits that are a function of link length. The equation was designed many decades ago for long-haul P2P links. Under the existing rule, a 1 kilometer link is limited to 36 dBm – much lower than the power needed to provide robust high-throughput broadband service to a site-specific, frequency coordinated service area.

The Coalition proposes a maximum EIRP of 50 dBm for licensed P2MP operations – 0.03 percent of the maximum EIRP of 85 dBm permitted for P2P fixed links -- and a maximum conducted power of 1 Watt. The lower power limits would apply both to access point and client devices. The Coalition does not propose any changes to the current power rules for P2P links.

Under the proposed new Subpart K rules, the Coalition proposes a maximum sector radius of 10 kilometers in more densely populated areas and up to 18 kilometers in rural areas for licensed P2MP service. The Coalition does not propose any changes to the P2P efficiency

standards of Section 101.141. Similarly, the Coalition does not propose any change to Section 101.143, which specifies a minimum path length for P2P FS links.

3. Radio Agility Requirements

The Coalition proposes that licensed P2MP radios (both access points and client devices) be frequency agile and thus capable of operating across the entire 3700 – 4200 MHz band, and accommodate any 20-megahertz channel assignment(s) as specified in Section 101.147(h). These requirements will ensure maximum flexibility for licensed P2MP operations to co-exist with incumbent FS and FSS licensees and with each other. A future automated database will facilitate a densification of P2MP networks by modifying channel and bandwidth assignments to allow the construction of new networks that would otherwise be unavailable through static coordination. Consequently, the Coalition proposes that access points be software upgradeable to communicate with a future automated database over the public internet, with client devices capable of following instructions from the associated access point to change channels and bandwidth as necessary.

4. Maximum Channel Size, Channel Bonding And TDD Operations

Section 101.147(h) organizes the band as a series of twelve paired channels of 20 megahertz each, and one unpaired 20 megahertz channel. The band plan assumes frequency division duplex ("FDD") operations, and unpaired operation is explicitly forbidden except for the uppermost channel. The industry, however, has moved toward time division duplex ("TDD") operations for broadband networks, and the Coalition anticipates that licensed P2MP service would utilize TDD. The new rules in Subpart K should explicitly permit operation on unpaired 20-megahertz channels, enabling TDD operations.

The Coalition does not propose any changes to the current channel plan or channel size. In some cases, licensees may only desire 20 megahertz of spectrum for their business model; in other cases, up to 160 megahertz of spectrum may be desired. The new rules under Subpart K would explicitly allow channel bonding of contiguous 20-megahertz channels, subject to coordination, up to a maximum of 160 megahertz of bandwidth for any licensee in a given area, subject to subsequent licensing and satisfaction of build-out obligations.

5. Emission Limits

The Coalition anticipates that P2MP systems would be able to meet existing Part 101 out-of-band emission limits, without modification.

6. Eliminate Utilization Requirement

Section 101.141(a)(3)(ii) requires that "traffic loading payload shall exceed 50 percent of payload capacity within 30 months of licensing." The loading rule was established many decades ago, when nearly all traffic was symmetrical analog voice traffic. Today, traffic is almost exclusively IP-based traffic, and such traffic is often highly asymmetric. As a practical matter, the Commission has no reliable way of measuring link loading. Accordingly, the Coalition recommends that the traffic loading requirement be eliminated for all Part 101 services.

7. Equipment Access

Current Section 101.131(a) provides that:

> The equipment at the operating and transmitting positions must be so installed and protected that it is not accessible to, or capable of being operated by, persons other than those duly authorized by the licensee.

The rules in new Subpart K should explicitly exempt licensed P2MP client radios from this requirement. Client radios providing low power P2MP services will operate from residential

premises. These licensed P2MP radios will not present an RF hazard. When operated at full power, the RF exposure keep-out zone for P2MP client radios operating at the proposed maximum EIRP level is less than 0.6 meters (2 feet).

8. Build-Out Requirements And Incremental Spectrum Licensing

In order to encourage careful spectrum planning and intensive use of the band, and to prevent spectrum warehousing that precludes use by others, the Coalition proposes that P2MP licensees be subject to a number of distinct conditions.

First, the Coalition proposes a build-out period of 12 months, a significant reduction from the 18-month build-out period applicable to Part 101 P2P licensees.

Second, frequency coordination should correspond to the specific equipment and antenna orientation the applicant selects.

Third, once coordinated, channels may only be reserved for 30 days, during which time the P2MP applicant must either file an application with the Commission that is consistent with the frequency coordination, or lose any informal protection it may enjoy as a result of its coordination. This will deter "placeholder" channel reservations that tie up frequencies, a problem that exists for P2P under Part 101 today and would be exacerbated with P2MP given the larger geographic area involved.

Fourth, as a minimum build-out standard, P2MP licensees must complete construction and commence service from at least one access point and at least five client radios within the licensed area within the 12-month period. Failure to do so should result in automatic loss of protection for the frequency coordinated geographic service area. However, to ensure continued

service to consumers, links already in service from that access point would maintain their coordinated protection on an individual, path-by-path basis.

Fifth, a P2MP licensee in the 3700 – 4200 MHz band should be limited to 40 megahertz of spectrum (*i.e.*, two 20-megahertz licenses) in its site-specific, frequency coordinated service area until it certifies to the Commission that it has satisfied the build-out requirements. At that point, the licensee could seek coordination of an additional 40 megahertz, subject to intervening coordinations filed by other parties, up to a maximum of 160 megahertz, in the licensed area. With a maximum of 160 megahertz per licensee, the 3700 – 4200 MHz band will accommodate multiple separate P2MP networks in the same local area. This rule will avoid contention, prevent spectrum warehousing, and promote competition in the fixed broadband market.

9. Automated Frequency Coordination

Coalition members have been involved in the creation of the TV white space database and the SAS for the CBRS band, and emphasize that the 3700 – 4200 MHz band does not require either existing method of interference protection. Instead, the existing frequency coordination process can ultimately be automated to govern interference protection criteria for incumbent FSS and FS facilities, incorporate "real-time, real-world" FSS protection criteria, and enable immediate coordination for any new facilities authorized under the proposed rules. As discussed above, a critical element to the accuracy of the database will be to require FSS licensees in the band to certify the operational status of their licensed facilities and update the database as operational circumstances change. Interference protection would not apply if any licensee, whether FSS, P2P or P2MP, failed to timely submit a notification of completion of construction.

The rules proposed herein can and should be implemented before the automated frequency coordination process is put in place. As with other spectrum management systems, the automated frequency coordination standards would be developed over time by industry stakeholders, including the satellite industry. This multi-stakeholder industry process will benefit all parties and, although an automated coordination mechanism is not necessary in the near term, it will be extremely useful to accommodate the far more intensive and efficient shared use of the band that will result from a Commission order adopting this new P2MP service.

Going forward, the Coalition proposes that terrain shielding and ground clutter be considered in the automated frequency coordination process using tools available or developed by industry stakeholders during the transitional period. These considerations will increase spectral efficiency based on "real world" circumstances.

The Coalition believes that this automated process will improve frequency coordination by mitigating the potential for human error, and that the automated process can enforce interference protection rules. Most significantly, the database can enable the more efficient use of spectrum by enabling more P2P and P2MP service in more locations without increasing the potential for harmful interference to authorized FSS facilities, results that would be in the public interest.

VII. CONCLUSION

Modernizing the Part 25 reporting requirements and amending the Part 101 rules to authorize a new licensed P2MP service will enable more efficient spectrum use, maximize sharing of the band, and accelerate fixed wireless broadband deployment in unserved and non-competitive markets. For the reasons set forth above, the Coalition urges the Commission to grant this Petition and to promptly issue a Notice of Proposed Rulemaking. Because this Petition proposes a "new technology or service" under Section 7 of the Act, the Commission should determine within one year that the proposed rules would promote the public interest.

Respectfully submitted,

BROADBAND ACCESS COALITION

June 21, 2017

PETITION FOR RULEMAKING: LIST OF EXHIBITS

Exhibit 1: List and Brief Description of Coalition Members

Exhibit 2: Map of Licensed FS Facilities

Exhibit 3: FSS C-band License and Renewal Applications (1988 – 2016)

Exhibit 1:
List and Brief Description of Coalition Members

EXHIBIT 1

BROADBAND ACCESS COALITION MEMBERS

Mimosa Networks, Inc.

Mimosa Networks is a leading provider of 5G Fixed wireless solutions that enable service providers to connect dense urban and hard-to-reach rural homes at a fraction of the cost of fiber-to-the-premises solutions.

WISPA

The Wireless Internet Service Providers Association (WISPA) is a membership-driven trade association that promotes the development, advancement and unity of the fixed wireless Internet service provider industry. WISPA has over 800 members that support WISPA's advocacy, education and other collaborative industry initiatives.

Open Technology Institute at New America

OTI and its Wireless Future Program work at the intersection of technology and policy to promote more open, fast and affordable wireless broadband connectivity and, more generally, universal access to communications technologies that are both open and secure. OTI is part of New America, a nonprofit and nonpartisan policy institute based in Washington, D.C.

All Points Broadband

All Points Broadband is a fixed wireless broadband provider serving customers in Virginia, Maryland and West Virginia.

American Library Association

The American Library Association (ALA) is the oldest and largest library association in the world. Founded in 1876, its mission is "to provide leadership for the development, promotion and improvement of library and information services and the profession of librarianship in order to enhance learning and ensure access to information for all."

Amplex Electric

Amplex is a fixed wireless broadband provider serving customers in Northwestern Ohio.

Cambium Networks

Cambium Networks is a leading global provider of fixed wireless networking solutions that connect the unconnected – People, Places and Things. Cambium Networks makes it possible for service providers and industrial, enterprise and government network operators to build affordable, reliable, high-performance connectivity.

Consumer Federation of America

The Consumer Federation of America is a national organization of more than 250 nonprofit consumer groups that was founded in 1968 to advance the consumer interest through research, advocacy, and education.

ConVergence Technologies, Inc.

ConVergence Technologies, Inc. provides Telecom, Wireless Broadband and IT infrastructure solutions to organizations throughout United States. ConVergence provides solutions that address all the technology needs of public, private and government organizations.

Cincinnati Bell Inc.

Cincinnati Bell Inc. provides integrated communications solutions – including local and long distance voice, data, high-speed Internet and video – that keep residential and business customers in Greater Cincinnati and Dayton, Ohio connected with each other and with the world.

Ethoplex

Ethoplex is a fixed-wireless operator serving the residential, business, MDU, and educational markets in Southeastern Wisconsin.

Intelliwave

Intelliwave broadband is a fixed wireless and fiber optic service provider that serves thousands of residential and commercial customers across 15 counties in Appalachian Ohio. Access to additional spectrum will help us speed our goal of serving all the unserved residents of our region.

Intelpath

Intelpath provides Frequency Analysis, Spectrum Management Solutions, and FCC License Procurement for Microwave Service Providers. By maintaining proprietary software and databases, Intelpath engineers select channels that enable optimal use of available spectrum.

JAB Wireless, Inc. dba Rise Broadband

JAB is the largest fixed wireless broadband provider in the United States, with more than 180,000 customers in 16 states.

Public Knowledge

Public Knowledge is a nonprofit digital rights advocacy organization headquartered in Washington, D.C. Public Knowledge promotes freedom of expression, an open internet, and access to affordable communications tools and creative works. Public Knowledge also works to shape policy on behalf of the public interest.

Quantenna Communications

Quantenna is a global leader and innovator of leading-edge performance Wi-Fi solutions. Quantenna introduced the world's first 10G Wi-Fi technology for a new generation of access points in home, enterprise and public spaces and continues to innovate.

Red Spectrum Communications, LLC

Red Spectrum is a high speed Internet Services Provider owned and operated by the Coeur d'Alene Tribe in North Idaho. Red Spectrum provides services through fixed wireless and fiber optic networks.

Schools, Health & Libraries Broadband Coalition

The SHLB Coalition is a broad-based organization of anchor institutions, commercial companies and non-profit broadband providers, foundations, public interest groups, and others that work together to develop and support policies to improve broadband connectivity for anchor institutions and their communities in all regions of the country – urban, suburban and especially rural.

Sho-Me Power Electric Cooperative

Sho-Me provides power to nine Rural Electric Cooperatives (RECs) who serve 26 counties in Missouri. Sho-Me Technologies, LLC, a subsidiary of Sho-Me Power, provides broadband services over an advanced optical network in Missouri. Sho-Me Technologies d/b/a Neighborhood Wireless, LLC, is dedicated to providing high-speed wireless Internet in Missouri.

SpeedConnect

SpeedConnect serves customers with wireless broadband internet, DISH TV and telephone service in Arizona, Idaho, Illinois, Iowa, Michigan, Minnesota, Montana, Nebraska, South Dakota and Texas.

Wisper, ISP, Inc.

Wisper ISP is a high-speed Internet provider to more than 12,000 business and residential customers in Illinois, Missouri, Oklahoma, Arkansas and Kansas.

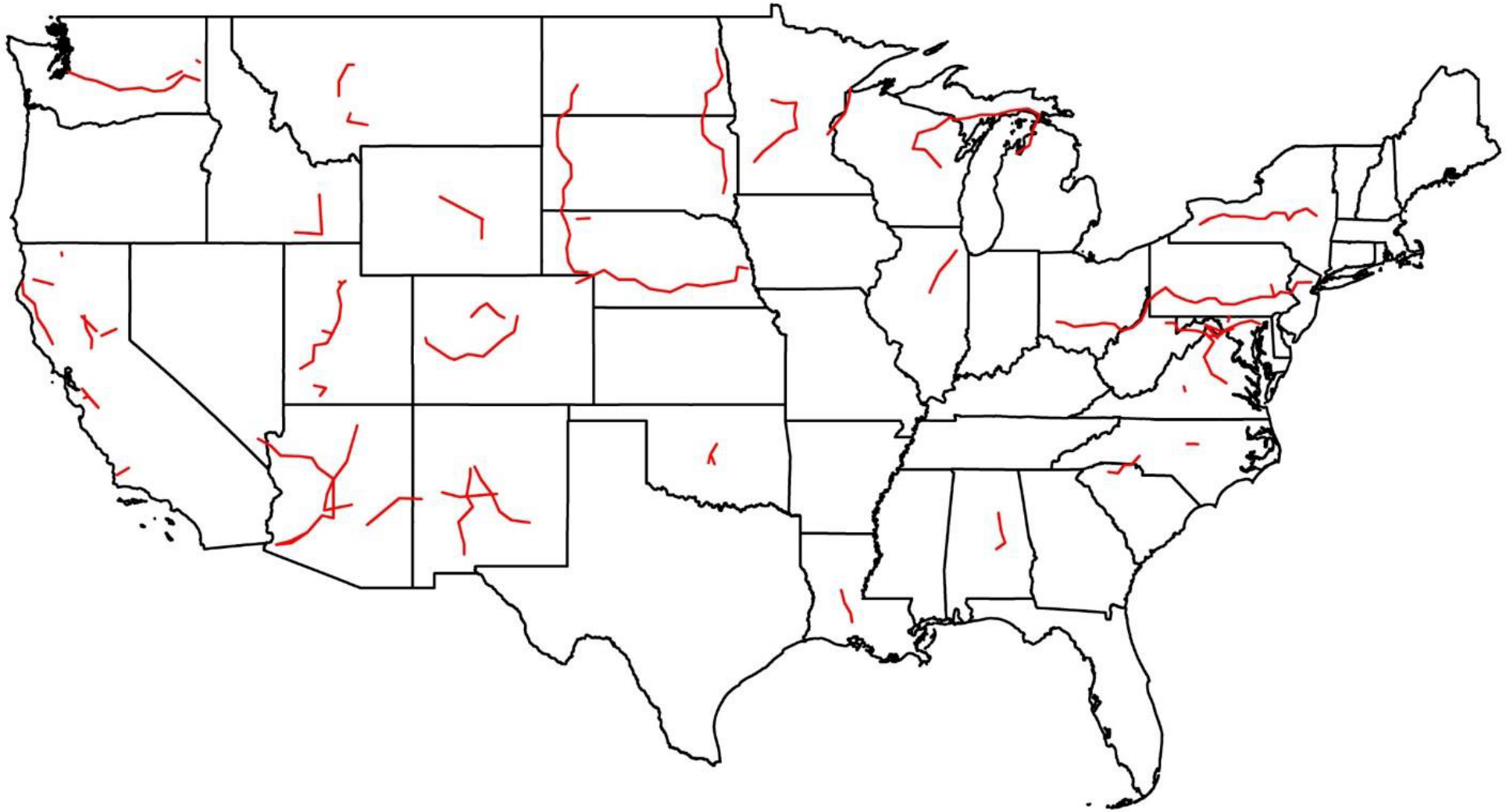
Telrad Networks Ltd

Telrad Networks is a recognized pioneer in the telecom industry, facilitating the connectivity needs of millions of end-users through operators, ISPs and vertical markets around the globe. Our current focus is on LTE products designed to enable wireless broadband connectivity, empowering our customers with solutions that look toward the future – while offering the versatility and affordability required to meet the existing needs of evolving wireless networks.

US Internet

US Internet, located in Minneapolis, Minnesota, is a provider of Internet and Fiber Optic Services. With its roots firmly entrenched in the ISP sector, US Internet offers a dynamic portfolio including the Minneapolis Wireless Network and Data Center services.

Exhibit 2:
Map of Licensed Fixed Service (FS) Facilities



Current 4 GHz Fixed Point to Point Networks

(based upon FCC ULS files from May 2015)

Exhibit 3:
Fixed-Satellite Service (FSS) C-band License and Renewal Applications (1988 – 2016)

Year	New Licenses	New Renewals	New Registrations	Year	Total New Grants	Year	Total New Licenses + New Registrations	Year	Licenses	Renewals	Registrations	Year	Total New Surrenders
2016	4	0	6	2016	10	2016	10	**2016**	11	2	0	2016	13
2015	17	0	44	2015	61	2015	61	**2015**	11	265	14	2015	290
2014	18	0	5	2014	23	2014	23	**2014**	2	63	6	2014	71
2013	37	0	92	2013	129	2013	129	**2013**	5	44	0	2013	49
2012	37	113	22	2012	172	2012	59	**2012**	3	73	0	2012	76
2011	25	400	68	2011	493	2011	93	**2011**	12	98	0	2011	110
2010	26	401	21	2010	448	2010	47	**2010**	6	101	2	2010	109
2009	46	284	37	2009	367	2009	83	**2009**	14	113	0	2009	127
2008	61	150	23	2008	234	2008	84	**2008**	15	117	1	2008	133
2007	51	224	50	2007	325	2007	101	**2007**	8	208	0	2007	216
2006	52	393	163	2006	608	2006	215	**2006**	15	144	0	2006	159
2005	46	207	104	2005	357	2005	150	**2005**	20	78	3	2005	101
2004	60	389	226	2004	675	2004	286	**2004**	26	125	1	2004	152
2003	78	458	83	2003	619	2003	161	**2003**	30	97	2	2003	129
2002	90	562	69	2002	721	2002	159	**2002**	10	113	13	2002	136
2001	57	445	78	2001	580	2001	135	**2001**	18	100	9	2001	127
2000	127	297	360	2000	784	2000	487	**2000**	21	78	26	2000	125
1999	70	234	151	1999	455	1999	221	**1999**	22	40	21	1999	83
1998	87	210	73	1998	370	1998	160	**1998**	6	13	33	1998	52
1997	123	447	234	1997	804	1997	357	**1997**	30	39	15	1997	84
1996	141	346	209	1996	696	1996	350	**1996**	10	13	23	1996	46
1995	84	339	146	1995	569	1995	230	**1995**	44	40	36	1995	120
1994	59	270	151	1994	480	1994	210	**1994**	65	52	15	1994	132
1993	110	610	208	1993	928	1993	318	**1993**	224	23	46	1993	293
1992	72	798	169	1992	1039	1992	241	**1992**	45	19	7	1992	71
1991	232	659	47	1991	938	1991	279	**1991**	46	23	2	1991	71
1990	279	293	0	1990	572	1990	279	**1990**	81	32	0	1990	113
1989	463	95	0	1989	558	1989	463	**1989**	70	8	0	1989	78
1988	369	13	1	1988	383	1988	370	**1988**	2	0	0	1988	2
TOTAL	**2599**	**7065**	**2472**		**12136**		**5761**	**TOTAL**	**785**	**1037**	**252**		**2074**