

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

In the Matter of)
)
Promoting More Efficient Use of Spectrum) ET Docket No. 10-237
Through Dynamic Spectrum Use Technologies)
)

COMMENTS OF PUBLIC KNOWLEDGE

Public Knowledge (PK), a non-profit advocacy organization dedicated to protecting the rights of the public in the emerging digital culture, file these comments to discuss how the widespread availability of TV Broadband Devices (TVBDs) authorized by the Commission can serve as a valuable platform for dynamic secondary market transactions under the Commission’s “private commons” rules.¹ By adopting relatively modest rule changes, the Commission can leverage this new technology to spur further innovation in cognitive radio technology and free more spectrum for productive use.

INTRODUCTION

**APPLICATION OF DYNAMIC SPECTRUM TECHNOLOGY CAN IMPROVE
SECONDARY MARKETS.**

The Commission’s *2004 Secondary Markets Order* sought to promote the development of dynamic spectrum technologies and secondary markets through the use of “private commons” arrangements.² Specifically, the Commission hoped that this arrangement would facilitate the use of peer-to-peer devices utilizing spectrum in a manner similar to that used by unlicensed network devices, but enjoying the interference protection and higher power available to licensed

¹ See 47 C.F.R. §1.9003.

² *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, 19 FCCRec 17503 (2004) (“*2004 Secondary Markets Order*”).

spectrum.³ Despite soliciting further comment on modifications that might further these goals, the Commission concluded in 2007 that the rules adopted in 2004 struck an appropriate balance between flexibility and caution at such an early stage of development.⁴

To date, despite some continuing interest from the private sector, no one has entered into a “private commons” arrangement. The question before the Commission in this proceeding is whether the failure of a dynamic leasing market to develop results from barriers that the Commission may cure through further regulatory efforts, or if the market simply does not support such a private commons arrangement.

PK staff have participated in several meetings and workshops with potential users of a dynamic spectrum “spot market” and have reached some tentative conclusions with regard to why dynamic spectrum leasing has yet to emerge as a viable means of meeting spectrum access needs. These include: (1) a lack of readily available technology to facilitate realtime dynamic auctions; (2) the existing Commission rules provide too many barriers and insufficient incentives to licensees potentially interested in leasing spectrum; and, (3) reluctance by potential lessees to rely on untested technologies and business models. The first problem, the lack of readily available technology, has been resolved by action the development of the white spaces database. The second problem, barriers created by the existing secondary market rules, can be addressed by the Commission through the steps described below. Similarly, the Commission can help “prime the pump” by providing certain limited incentives to licensees to make capacity available. As for the current reluctance expressed by some stakeholders, it seems likely that availability of useful spectrum will overcome this resistance over time.

³ *Id.* at ¶¶159-65.

⁴ *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, Third Report and Order*, 22 FCCRed 7209 (2007).

ARGUMENT

I. TECHNOLOGIES TO FACILITATE DYNAMIC SECONDARY MARKET TRANSFERS ARE POISED TO ENTER THE MARKET.

It is a truism that no one develops technologies for a non-existent market. This creates a “chicken and the egg” problem for dynamic spectrum use designed exclusively for secondary markets. The potential market for such “private commons” arrangements is difficult to gauge, whereas the expense and likely delay in introducing such technologies – particularly in the face of a possibly lengthy and adversarial approval process at the Commission – are quite significant. Unsurprisingly, despite approval of private commons rules in 2004, no one has sought approval of devices necessary to make such dynamic leasing possible. Without such devices, willing buyers and willing sellers cannot take advantage of the existing rules and demonstrate that market demand exists. Without a demonstration of sufficient market demand, no one will develop devices.

Recent developments discussed below suggest that this problem may now be resolved. The recently approved white spaces technology provides a platform that will soon be widely available and is designed for devices capable of dynamically shifting between bands while respecting rules to protect neighboring licensed services. Because the market demand for unlicensed use is sufficiently proven, a number of companies have invested in developing this technology and expect to deploy these devices widely.⁵ These devices operate in precisely the way the Commission hoped “private commons” devices would – enabling peer-to-peer networks among frequency agile radios that obey rules dictated by a master “spectrum manager” (here, the white space database manager rather than a “lease manager” or licensee).

⁵ As evidence of anticipated widespread deployment, PK notes that the Internet Engineering Task Force (IETF) has begun work on an open standard for accessing the white spaces database. Available at: https://datatracker.ietf.org/doc/draft-patil-paws-problem-stmt/?include_text=1

The imminent widespread deployment of such devices solves one critical impediment to private commons – a suitable device platform. Recent developments likewise suggest that a software package could be quickly developed and implemented that would take advantage of the device platform. The attached technical paper by Kash, Murty, and Parkes demonstrates one possible approach that could be independently developed and layered on top of the any white space database.⁶ Kash, *et al.* describe an algorithm they call Satya, capable of handling realtime dynamic auctions for spectrum access.

Satya and the white spaces platform provide the foundation for devices capable of engaging in dynamic spectrum leasing of the kind the Commission has sought to encourage since it first adopted the private commons rules in 2004. To allow these pieces to combine effectively, however, the Commission must adopt several rule changes.

II. RULE CHANGES REQUIRED TO FACILITATE DYNAMIC SECONDARY MARKETS.

To enable dynamic secondary markets to flourish, the Commission must take several regulatory steps. First, the Commission must clarify that broadcast band white space database managers may also act as spectrum managers for dynamic secondary market leasing – subject to the clear understanding that embarking on such a line of business would not interfere with their primary responsibility to maintain the database for unlicensed use. Ideally, database providers would offer device users the option to acquire additional spectrum capacity on a dynamic basis for those users that may find that free access for unlicensed use does not adequately meet their needs.

⁶ “Enabling Spectrum Sharing In Secondary Market Auctions,” Harvard Technical Report TR-08-10, Ian Kash, Rohan Murty, and David C. Parkes (2010).

Although there is nothing in the existing rules that would explicitly prevent such arrangements, the Commission should proactively take steps both to avoid any future confusion and to ensure that the primary purpose of the white spaces database remains enabling unlicensed access. In particular, the Commission must make it clear that any such secondary market services provided by white spaces database managers cannot interfere with the database manager's primary responsibility to maintain the white spaces database, nor can database managers bundle such services so that access to the unlicensed white space database depends on the technical capacity or willingness to access the leasing components of the service. The ability to offer "private commons" leasing must remain a wholly separate additional line of business, conducted in a way that leverages the availability of a necessary technical platform but which does not compromise the primary purpose for which the Commission authorized the platform in the first place – the ability to provide *unlicensed* access on a dynamic basis.

If the Commission moves forward in a subsequent rulemaking, it will need to address several questions relating to the use of the white spaces technology for secondary market use. These questions do not present obvious answers at the moment, and others may present themselves. But PK here offer some guidance for what they hope will be a subsequent rulemaking that will address these matters.

1. *Should licensees offering capacity for secondary market use be required to list their capacity in every database?*

The Commission adopted a rule permitting multiple database operators for the white spaces and that these operators be required to share all available information so that no matter which database a device contacted, it would receive the same information on frequency

availability.⁷ PK, among others, supported this rule as a means of encouraging competition and avoiding the creation of any “bottleneck” provider that could leverage control of the database to extract additional fees or otherwise impose barriers to the unlicensed use of the broadcast white spaces.

Such concerns do not appear to arise in the context of secondary market transactions. To the contrary, allowing database operators to differentiate themselves on the basis of their secondary market inventory may prove an important mechanism for enhancing competition and service innovation between providers. The Commission should therefore not assume that rules governing entry in the unlicensed database must also apply to the voluntary commercial transactions between licensees, database managers, and lessees. On the other hand, interested parties may well provide persuasive arguments for why listings of spectrum capacity for secondary market purposes should be uniform and appear in every database. In addition, as the technology becomes increasingly established, parties may emerge that wish to operate databases exclusively for secondary market purposes. Indeed, licensees themselves may want to find ways to make capacity available without the need to use a database manager at all. The Commission should explore these issues should it proceed to a rulemaking based on this NOI.

2. How Can The Commission Assure Uniformity of Output?

The design of the white spaces permits a great deal of flexibility with regard to such factors as output capacity, channel separation, and so forth. But the current design assumes that any output is available for flexible use. Unlicensed white space devices have no broadcast requirements or service limitations comparable to broadcasting or secondary services such as

⁷ *Unlicensed in the TV Broadcast Bands*, 2nd Memorandum Opinion & Order, (rel. Sept. 23, 2010) ¶¶101-07.

cable headends. By contrast, a number of services either available for secondary leasing or proposed to be available for secondary leasing have use restrictions in addition to restrictions on power output and so forth.

To encourage use of dynamic secondary markets, PK proposes that any capacity made available the white spaces platform on a dynamic basis be available on a flexible use basis.⁸ This would not violate the basic principle that a licensee cannot provide greater protection than it has. Rather, as explained in more detail in Part III below, the Commission would convert the spectrum to flexible use as part of the *de facto* transfer to the dynamic database manager, and it would remain flexible use only so long as it remained available for dynamic secondary market leasing. To avoid providing an undue windfall to licensees and to avoid encouraging speculation in existing licenses and future auctions of services with use restrictions, the Commission should only permit flexible use in conjunction with dynamic secondary market leasing. This will also avoid to possibility that a single entity or small group of entities could acquire a monopoly in available capacity.

3. Should Private Commons Spectrum Receive The Same Level Of Interference Protection As the Primary Licensee?

PK recognizes that licensees in neighboring bands have legitimate interference concerns at the prospect of numerous devices operating under flexible use rules at power levels designed to accommodate restricted use. At the same time, a key advantage in leasing spectrum, rather than relying on unlicensed spectrum, lies in the ability to use higher power with greater interference protection. In an ideal world, users of dynamic spectrum devices should enjoy

⁸ See 47 U.S.C. §303(y).

certainty with regard to their capacity, and would be able to pay an additional premium by leasing from a primary service and enjoying that level of protection.

The Commission should therefore consider whether outputs available for leasing should receive the same level of interference protection as available to the licensee. PK suggests that an initial approach might be to allow those services that already enjoy flexible use to be available at the same terms as for standard lease agreements. By contrast, if the Commission adopts the recommendation made above to allow flexible use for non-flexible use spectrum, spectrum converted to flexible use via secondary market use should be treated as secondary to all pre-existing licensed services. This way, existing licensees can have confidence that permitting flexible use to new spectrum will not create harmful interference.

III. CHANGES TO ENCOURAGE LICENSEES TO LEASE CAPACITY VIA PRIVATE COMMONS/WHITE SPACES TECHNOLOGY.

To encourage licensees to make their excess capacity available, the Commission will need to provide for the following: it must be simple for licensees to make capacity available, licensees must have confidence that they can reclaim spectrum as needed, and licensees must have confidence that by giving up control they do not expose themselves to liability. In addition, the Commission can create positive incentives for licensees to use dynamic secondary market systems as a means of freeing up spectrum for flexible use. For example, the Commission could establish that licensees satisfy their build out requirements by making spectrum available through dynamic secondary market leasing. As discussed below, this carrot would free the Commission to use the “stick” of license renewal more effectively as well.

1. *Specific Rule Changes To Facilitate Ease of Use By Licensees.*

To encourage licensees to make capacity available, the Commission must make it as easy as possible for licensees to use the secondary market system. At the same time, the Commission must comply with the statutory requirements of the Communications Act. Transfer of a license requires public notice and an opportunity for any party to oppose the transfer,⁹ following which the FCC must make an explicit finding that the transfer serves the public interest, convenience and necessity.¹⁰ In addition, the Commission must satisfy itself that licensees meet the prohibition on foreign ownership.¹¹

These requirements prompted the Commission to create the current filing requirements for spectrum lease managers and *de facto* lease transfers. But even these requirements impose significant complication and delay. Discussion with licensees indicates that the need to file separate applications for each lease manager and *de facto* transfer provides a significant disincentive to make capacity available to secondary markets.

PK recommends that the Commission can reduce this burden and enhance the likelihood that licensees will seek to make capacity available through dynamic secondary market systems through one of two approaches. First, the Commission could treat management of spectrum designated by licensees for dynamic secondary market leasing as a form of lease management agreement, but – in recognition that the nature of the device ensures compliance with interference restrictions – the Commission would relieve the licensee of strict liability for interference compliance. Under this approach, The Commission would establish by rule that

⁹ 47 U.S.C. §308(a).

¹⁰ 47 U.S.C. §310(d).

¹¹ 47 U.S.C. §§310(a)-(c).

entities which meet set criteria in satisfaction of the statutory requirements are eligible to act as lease managers for licensees desiring to use their services for dynamic auctions.

Specifically, PK recommends that the Commission modify Rule 1.9003 so that entities that comply with the foreign ownership requirement and operate a dynamic secondary market assignment system that permits real-time auction and assignment that meet specified technical standards to ensure that devices accessing the system cannot exceed the limitations set by the licensee will receive a license to operate any spectrum made available by a licensee. Licensees that experience interference as a result of the operation of the dynamic auction system could alert the lease manager to abate the interference, rather than contact the licensee leasing the capacity.

Alternatively, if the Commission is unwilling to grant licensees sufficient freedom from liability under the lease manager regulations, the Commission could consider these transfers as streamlined *de facto* license transfers. The Commission has, in the past, permitted “pre-clearing” of license approvals where doing so serves the public interest.¹² Further, the Commission has granted licenses to equipment manufacturers that allow equipment operators to use licensed spectrum without the need for a specific license.¹³ Under the logic of these precedents, the Commission could modify the *de facto* rules to permit a licensee to register an eligibility to transfer its entire license capacity for dynamic leasing, but reserving the right to subsequently limit the transfer. If no party objects to the initial *de facto* transfer, the Commission would treat

¹² See, e.g., Implementation of Section 402(b)(2)(A) of the Telecommunications Act of 1996; Petition for Forbearance of the Independent Telephone & Telecommunications Alliance, *Report and Order and Second Memorandum Opinion and Order*, 14 FCC Rcd 11364, 11372, ¶12 (1998) (“[W]ith blanket authority, unlike forbearance, we retain the ability to stop extremely abusive practices against consumers by withdrawing the blanket section 214 authorization that allows the abusive carrier to operate.”)

¹³ See Amendment of the Commission’s Rules to Allocate Spectrum for, and to Establish Other Rules and Policies Pertaining to, a Radiodetermination Satellite Service; Policies and Procedures for the Licensing of Space and Earth Stations in the Radiodetermination Satellite Service, *Second Report and Order*, 104 F.C.C. 2d. 650, ¶¶ 28–29 (Apr. 22, 1986).

any subsequent modifications (such as limitation of availability by geographic area) as a “minor amendment” for purposes of the rules and would not require any further public notice beyond accessible publication in the database manager’s database.

The effect of this rule change would be to allow licensees to register their spectrum “inventory” with a duly licensed dynamic secondary market provider. Once the comment period passed, the licensee could easily adjust its permissions to the operator to allow it to customize by geographic area, power level, or other specification the precise terms under which it would lease capacity. The use of pre-approved templates and the flexibility to the licensee to customize and maintain control would eliminate the existing burdens on licensees. Licensees would not need to negotiate each contract with each would-be lessor. Nor would licensees need to refile for each new transaction. After the initial delay to satisfy statutory obligations of public notice, the licensee could make any changes or alterations in its permissions in realtime.

It is important to note that creation of such a streamlined process should only apply for “private commons” type leasing and not for secondary market transactions generally. Private commons arrangements of the kind described above have several safeguards that ensure that the proposed streamlining genuinely serves the public interest. First, the Commission can assure itself that the entity receiving the *de facto* transfer or lease management agreement complies with the Commission’s rules and the requirements of the statute. Second, the use of white spaces-type technology ensures that the lessees do not violate the power limits or other technical rules. The nature of the technology makes violation inherently impossible and subject to ongoing control by licensees and by the Commission. Finally, the fact that assignment occurs dynamically in realtime prevents any entity from monopolizing spectrum access in any given area. Devices will continue to bid against each other seeking capacity as long as it is available. Any effort to lease

out capacity in such a system for the sole purpose of blocking a potential competitor would quickly become prohibitively expensive.

2. Possible Incentives For Licensees.

Because dynamic secondary market systems increase the availability and “liquidity” of spectrum, the Commission should consider whether to adopt incentives to encourage licensees to make excess capacity available. For example, the Commission should consider whether licensees that make spectrum available through a private commons system of the kind described above should be considered to have met their build out and service requirements. This would allow residents in the least populated areas to independently service themselves, rather than rely on licensees unwilling or unable to extend towers and other infrastructure to areas with lower rates of return.¹⁴

This approach may work best in combination with possible rescission of license areas if licensees fail to meet their build out requirements under a “use or lose” system. The problem with the existing “use or lose” rules, where implemented, is that they essentially reward those who fail to meet their build out requirements by relieving them of the obligation to serve less densely populated areas. Meanwhile, these areas continue to go unserved. At the same time, the Commission has traditionally been reluctant to rescind licenses as long as any portion of the license area receives “substantial service.”

Adopting a combined incentive/penalty approach will make spectrum and devices able to effectively utilize that spectrum available to residents regardless of whether a licensee build out

¹⁴ To prevent licensees from hoarding spectrum, they should be required to make their entire unused capacity available in areas where they have not built out their networks. Allowing licensees to offer spectrum in unbuilt areas on unattractive terms would defeat the purpose of the incentive – to unlock unused capacity for productive use.

its network. A licensee can receive the modest reward of spectrum lease fees for those portions of the license area not covered by its network, while retaining the ability to withdraw the spectrum from the lease pool if it ever does deploy in the area. If the licensee fails to deploy, the uncovered area can be designated as eligible for unlicensed use. This will free trapped spectrum for productive use, prevent speculators from enjoying any windfall, and prevent licensees from leveraging their refusal to build out into additional spectrum rights.

CONCLUSION

The Commission's embrace of dynamic spectrum access through unlicensed access to the broadcast white spaces provides the platform on which new, innovative technologies and business models will emerge. The proposal for layering an additional capacity for "private commons" style dynamic leasing represents only the first of the "low hanging fruits" the American people will harvest as unlicensed white space access moves from certification to ubiquity. It is not too early for the Commission to begin to explore how it can build on its initial success. The proposed rule modifications would allow licensed services to begin to realize the benefits of these new technologies, and the Commission should move quickly to a Notice of Proposed Rulemaking along the lines recommended above.

Respectfully submitted,

/s/

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