

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

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

COMMENTS OF VERIZON WIRELESS

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Verizon Wireless hereby submits its initial comments on the Notice of Inquiry (“NOI”) in the above-captioned proceeding.¹

I. INTRODUCTION AND SUMMARY

The NOI seeks comment on ways in which dynamic spectrum access technologies can promote more intensive and efficient use of the radio spectrum.² The surest way for the Commission to promote the most efficient use of spectrum is to stay the course of strong spectrum rights and flexible use licenses. This licensing model, which grants licensees the flexibility to “mine” the spectrum to the maximum extent feasible, increases the value of spectrum, facilitates the operation of secondary markets, and fosters the development of innovative equipment and services – all to the benefit of wireless consumers.

¹ *Promoting More Efficient Use of Spectrum Through Dynamic Spectrum Use Technologies*, Notice of Inquiry, FCC 10-198 (Nov. 30, 2010) (“NOI”).

² *Id.* at ¶ 2.

This is the third proceeding in recent years in which the Commission sought comment on this topic.³ While the Commission should continue to monitor the development of these technologies, it should follow the same course it took before and allow them to be developed and deployed in response to market demands. CMRS licensees use their spectrum intensely and efficiently and are already employing some of the dynamic spectrum access technologies in their networks today the Commission identifies to enhance efficient use even further. There is no need, nor any basis, for regulatory intervention. In contrast, forcing licensed spectrum users to accept third party use of these technologies in that same licensed spectrum would undermine carriers' efficiency efforts by causing harmful interference, inhibiting the development of future technologies, and minimizing licensees' incentives to use spectrum efficiently.⁴ If the Commission wishes to promote the development of dynamic spectrum access technologies, it should maintain its long-standing, successful flexible use and secondary markets policies. In addition, it should continue to study the development of dynamic spectrum access technologies in bands that have already been identified for such uses,

³ See *Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands*, Notice of Inquiry and Notice of Proposed Rulemaking, 18 FCC Rcd 25309 (2003); *Facilitating Opportunities for Flexible, Efficient and Reliable Spectrum Use Employing Cognitive Radio Technologies, Authorization and Use of Software Defined Radios*, Notice of Proposed Rulemaking, 18 FCC Rcd 26859 (2003).

⁴ Verizon Wireless retained V-COMM to evaluate the dynamic spectrum access technologies available today and their potential impact on wireless networks. V-COMM is an engineering firm specializing in providing expertise to wireless operators and governmental agencies in system design, network engineering, implementation, network expansion, system performance, and optimization. V-COMM's report is attached to these comments and confirms that forced sharing would result in harmful interference to existing CMRS systems. See Attachment A, Comments of V-COMM (dated Feb. 28, 2011) ("V-COMM Comments").

and consider whether such technologies could make spectrum bands that are currently allocated for limited purposes more widely usable.

II. THE COMMISSION’S EXISTING FLEXIBLE LICENSING SCHEME HAS PROMOTED THE DEVELOPMENT AND USE OF DYNAMIC SPECTRUM ACCESS TECHNOLOGIES.

The Commission has determined repeatedly that it is in the public interest to allow licensees greater flexibility and to let markets determine the best use of spectrum. These long-standing policies have enabled licensees to deploy new methods and technologies to manage and control access and interference, while also enabling them to serve efficiently a rapidly growing number of customers.

For the last several decades, the Commission has endeavored to put in place market-driven procedures to minimize what its own economists call the “shortages and waste” that the administrative allocation of spectrum entails.⁵ Under this market-driven policy, the Commission assigns licenses on a geographic basis and then gives licensees flexibility to determine the types of services they will provide and the technologies and technical implementation designs used to provide those services. In addition, in its *Secondary Markets* decision, the Commission took important steps “to facilitate

⁵ See Evan Kwerel and John Williams, *A Proposal for a Rapid Transition to Market Allocation of Spectrum*, FCC Office of Plans and Policy Working Paper Series (November 2002) at iv (hereinafter “Kwerel and Williams”); Comments of Thomas Hazlett and Matthew Spitzer, *Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands*, ET Docket No. 03-237, at 31-36 (filed Apr. 5, 2004) (hereinafter “Hazlett and Spitzer”). The one – very limited – departure from that consistent policy was in the ultra-wideband proceeding. See *Revision of Part 15 of the Commission’s Rules Regarding Ultra-Wideband Transmission Systems, First Report and Order*, 17 FCC Rcd 7435 (2002), *recon. granted in part and denied in part*, 18 FCC Rcd 3857 (2003).

significantly broader access to valuable spectrum resources” by enabling spectrum licensees to enter into spectrum leasing arrangement with “a wide variety of facilities-based providers of broadband and other communications services.”⁶

The economic literature has consistently endorsed these policies of strong spectrum rights and flexible use.⁷ The Commission’s own economists agree that such policies produce large efficiency gains, because they (a) give spectrum users incentives to internalize most of the costs and benefits of their actions, and (b) minimize coordination and other transaction costs.⁸ To that end, the Commission has embraced the geographic-based, exclusive use licensing model that grants the licensee sole use of its assigned spectrum and the flexibility to “mine” the spectrum to the maximum extent feasible, subject to interference restrictions. The exclusive use licensing model increases the value of spectrum, fosters the development of innovative equipment and services, provides certainty to the capital markets, and facilitates the creation of secondary markets – all to the benefit of wireless consumers.

⁶ *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 20604, ¶ 2 (2003).

⁷ *See, e.g.*, Ronald Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1 (1959); Arthur S. De Vany *et al.*, *A Property System for Market Allocation of the Electromagnetic Spectrum*, 21 STAN. L. REV. 1499 (1969); Douglas Webbink, *Radio Licenses and Frequency Spectrum Use Property Rights*, COMM. & THE LAW 4 (1987); Gregory Rosston and Jeffrey Steinberg, *Using Market-Based Spectrum Policy to Promote the Public Interest*, 50 FED. COMM. L.J. 87 (1997); Thomas Hazlett, *The Wireless Craze, the Unlimited Bandwidth Myth, the Spectrum Auction Faux Pas, and the Punchline to Ronald Coase’s “Big Joke”*: *An Essay on Airwave Allocation Policy*, 14 HARV. J.L. & TECH. 335 (2001).

⁸ *See* Kwerel and Williams at 5; *see also* Hazlett and Spitzer at 18-21.

Moreover, these policies have allowed wireless carriers to optimize their spectrum use by effectively and efficiently deploying wireless networks that use a variety of technologies, including the dynamic spectrum access technologies the Commission asks about in this proceeding. For example, Verizon Wireless optimizes the use of its spectrum by, among other things, using CDMA technology. CDMA transmitters adjust power levels 800 times per second to ensure that only the minimum power necessary is used to maintain a connection. CDMA networks also incorporate cognitive capabilities to allow more efficient use, although there was no regulatory requirement to incorporate such capabilities. It was precisely this lack of a regulatory mandate to install a specific technology, coupled with a licensee's exclusive rights to mine its spectrum, that spurred mass adoption of radios with cognitive capabilities.

These policies also have promoted significant investment in wireless networks. Relying on these long-standing and well-established rights, Verizon Wireless has invested over \$65 billion since it was formed – an average of \$6 billion every year – to make increasingly efficient use of its licensed spectrum. These investments have permitted Verizon Wireless continuously to expand both its customer base, which is over ninety million customers at present, and the total volume of wireless traffic it handles, while also deploying next generation technologies. As a result, these policies have allowed the wireless service market as a whole to create consumer benefits worth many billions.⁹

Verizon Wireless and other wireless carriers continue to invest in and upgrade their networks to ensure they are obtaining maximum spectral efficiency. For instance,

⁹ See Hazlett and Spitzer at 33.

CDMA technology has continuously improved over the years, allowing carriers to expand the capacity of their systems, to serve more customers, to provide greater service reliability at the edge of cell sites, to provide better in-building coverage throughout the service area, and to support the growing demand for wireless broadband services. And carriers are investing in new advanced technologies, such as Long Term Evolution, that further promote spectral efficiency while providing customers with much higher data rates and greater functionalities.

The advanced technologies wireless carriers are deploying today often use dynamic spectrum access technologies and ensure CMRS networks operate at the optimum level of spectrum efficiency and utilization. LTE, for example, uses sensing technology at the receiver used by the system in conjunction with advanced scheduler algorithms to optimize the use of CMRS spectrum. LTE also uses adaptive modulation that adjusts and optimizes spectrum usage according to the RF environment, dynamic power controls that adjust and optimize power levels a thousand times per second, advanced spectrum management techniques, MIMO antenna systems that use multiple polarities and diversity transmit and receive algorithms such as spatial-multiplexing, and other dynamic radio technologies to optimize spectrum utilization and efficiency.¹⁰ Finally, LTE devices use spectrum searching mechanisms to operate on appropriate bands in other markets when roaming and when switching to unlicensed wireless systems.¹¹

¹⁰ See V-COMM Comments at 18-19.

¹¹ V-COMM Comments at 19.

III. THE COMMISSION SHOULD NOT MANDATE INVOLUNTARY SHARING IN ALREADY LICENSED CMRS SPECTRUM.

The NOI seeks comment on whether the Commission should revise its flexible use policies in order to realize fully the promise of dynamic spectrum access technologies and on what spectrum bands are most suitable for dynamic spectrum use.¹² As detailed above, however, the Commission's flexible use policies for CMRS spectrum already help to ensure spectrum is put to its highest and best use. Thus, the Commission should not require CMRS licensees to share their spectrum with dynamic spectrum access technology users under any circumstances. Not only is there no need for taking action but such a radical change in policy would risk substantial interference to existing licensees, inhibit the development of future CMRS networks, fail basic economic principles, and violate licensees' existing spectrum rights.

A. Forced Sharing of Licensed Spectrum Would Harm Existing Wireless Systems.

Verizon Wireless and others have shown in prior proceedings that the deployment of dynamic spectrum access technologies in licensed CMRS bands will cause substantial interference when they are not managed by a single licensee.¹³ Dynamic spectrum access radios cannot overcome fundamental physics – noise levels and interference depend on

¹² NOI at ¶¶ 37, 43.

¹³ See, e.g., Comments of Verizon Wireless, ET Docket No. 03-237 (filed Apr. 5, 2004); Comments of Verizon Wireless, ET Docket No. 03-108 (filed May 3, 2004); Comments of V-COMM, LLC, ET Docket Nos. 03-237, 03-108 (filed Apr. 5, 2004); Comments of the Cellular Telecommunications & Internet Association, ET Docket No. 03-237 (filed Apr. 5, 2004); Comments of Cingular Wireless LLC and BellSouth Corporation, ET Docket No. 03-108 (filed May 3, 2004).

the locations of the transmitter and receiver, and vary from one moment to the next.

These interference problems continue to exist today:

- There may be a clear transmission path between a licensed base station and a licensed mobile unit, but an obstructed path between the base station and the dynamic spectrum access device or an obstructed path between the mobile unit and the dynamic spectrum access device. The dynamic spectrum access device would read the channel as clear and begin transmitting, causing the licensed base station or mobile receiver to lose its connection. In addition, using multiple cooperating dynamic spectrum access devices will not solve this problem as multiple obstructions, clutter, propagation, reflections, fading, or other limitations could inhibit the dynamic spectrum access devices from appropriately sensing spectrum availability.
- CMRS networks operate at very low power levels to optimize spectrum utilization and efficiency. Dynamic spectrum access devices that are out of range of a licensed CMRS transmitter but within range of a receiver will incorrectly assess whether spectrum is available, causing interference to CMRS users.
- Dynamic spectrum access devices, like any other radio, cannot sense the channel status while transmitting. Licensed services cannot readily access spectrum because the dynamic spectrum access device will not readily relinquish the channel.
- In order to optimize call quality, CMRS systems use a variety of methods to sense interference levels from other callers on channels before assigning channels to users. These systems would detect transmissions from dynamic spectrum access devices and would therefore block channels from use, thereby impairing service to licensees' customers.
- Dynamic spectrum access radios would have a very difficult time distinguishing between noise, including signals from other dynamic spectrum access devices, and licensed wireless traffic. CDMA signals use extremely low power levels and resemble the existing noise level in the spectrum.

The use of dynamic spectrum access technologies in licensed bands by non-primary users¹⁴ will result in even greater interference today than just a few years ago.

As an initial matter, wireless carriers have deployed many types of networks on their licensed spectrum, including CDMA, EVDO, GSM, TDMA, SMR/IDEN, EDGE,

¹⁴ Non-primary users could include unlicensed users or any other users that are not the primary CMRS licensee.

UMTS, HSDPA, HSUPA, HSPA+, LTE, WiMAX, and others. All of these networks use different guard bands, frequency offsets, and operating bandwidths. And these networks are just the beginning. Wireless carriers continue to adopt and integrate new technologies into their networks. Thus, dynamic spectrum access technologies used by non-primary users would have to be able to detect the multitude of types of signals operating in CMRS spectrum today and in the future, an improbable if not impossible task.

In addition, advanced CMRS technologies, including LTE, operate in ways that make detection very difficult. For example, advanced CMRS technologies use spectrum in very small time intervals that prohibit the use of underlay users. The transmission time interval for LTE is in 1 millisecond time periods, resulting in a radio environment that changes millisecond by millisecond. Dynamic spectrum access technologies cannot perform sensing, detection, decision-making, and transmissions within that time frame. In addition, advanced CMRS technology signals operate at low power levels, making detection even more difficult.

Advanced CMRS technologies also can be more severely affected by interference. For instance, LTE networks use portions of their assigned spectrum for signaling and synchronization to manage user connections. Interference to these spectrum resources could cause significant outages and block licensed users from accessing the system.

Further, advanced CMRS technologies use advanced dynamic power control features to achieve high modulation rates required for broadband data communications. Forced sharing will increase noise and interference levels, which will increase CMRS transmit power levels, resulting in further noise level increases within CMRS spectrum that will reduce system capacity and broadband data throughputs.

Although dynamic spectrum access technologies have evolved over the years, these advances will not resolve the interference concerns identified above. For example, cooperative dynamic spectrum access devices¹⁵ will not overcome the hidden node problem, sensing a receiver problem, sensing while transmitting, or any of the other problems identified above.¹⁶ The use of cooperative dynamic spectrum access devices also would introduce additional delays into the detection and decision-making process for such devices making it more difficult for them to effectively detect existing licensed users. Similarly, interference detection technologies cannot reliably detect CMRS spectrum use due to the low signal and noise floor levels employed by CMRS technologies.¹⁷ In addition, geolocation databases will not work in the CMRS bands given the high mobility of users and ubiquitous deployment.¹⁸

For these and the other reasons stated in V-COMM's Comments,¹⁹ regulations promoting dynamic spectrum access devices by non-primary users in licensed bands will lead to increased interference with CMRS services, harming networks' reliability and harming customers. The result would be to force licensed carriers to spend scarce resources just to cope with interference and degraded service quality. The substantial costs of doing so would impair a licensee's ability to deploy new services to meet customers' demands. Further, even if carriers expend resources in an attempt to cope with interference, such actions cannot eliminate fully the interference that will be caused

¹⁵ NOI at ¶ 22.

¹⁶ *See supra* 8-10.

¹⁷ NOI at ¶ 23.

¹⁸ NOI at ¶¶ 24, 48.

¹⁹ V-COMM Comments at 4-15.

by these devices. And once these devices are authorized within CMRS spectrum and deployed, there is no effective way to remove them completely from the market, even if they are operating unlawfully and causing harmful interference to incumbent users.

B. Forced Sharing Could Inhibit Wireless Innovation.

In addition to causing harmful interference to existing CMRS networks and customers, mandatory sharing would significantly undermine carriers' ability to maintain and upgrade their networks and provide services to the public. Forced sharing of CMRS spectrum will increase noise and interference levels within CMRS spectrum. Since CMRS networks already operate at low noise levels, the increased noise and interference caused by operations from non-primary users will result in decreased system capacity, increased dead zones, reduced throughput, interference to E911 location and communication signals, and poor quality of service, ultimately harming wireless consumers. In addition, carriers will be unable to actively manage their networks and optimize spectrum use as they will be unable to access and use spectrum that has been taken over by dynamic spectrum access devices used by non-primary users. Finally, licensees' ability to migrate to future technologies could be limited. If the Commission were, for example, to grant non-primary users the right to access CMRS spectrum, future CMRS networks must be capable of accommodating these devices in the same spectrum, which may not be possible without significant harm to existing users. Such capabilities, however, may prevent other developments that would allow carriers to provide more advanced services or more efficiently utilize spectrum for their own purposes, thus restricting the development of future advanced wireless networks.

C. Forced Sharing Fails Basic Economic Principles and Cost-Benefit Analysis.

The NOI discusses the use of dynamic spectrum access technologies in licensed spectrum purely as a technical interference issue.²⁰ The allocation of rights to use resources such as spectrum, however, is also an economic issue. Mandatory sharing is inconsistent with basic economic principles and fails cost-benefit analysis. Rigorous, defensible economic analysis is an essential predicate to reversing the Commission’s long established policy of giving licensees the right to fully mine the spectrum allocated to their licenses. Such analysis is particularly essential because licensees have relied on that policy in making the multi-billion dollar investments in spectrum, R&D, network equipment, customer handsets and service development that have spurred innovation and created a robust, vibrant, fast-growing market for wireless services.²¹ CMRS licensees serve more than 292 million wireless connections.²² These licensees spend over \$20 billion annually on network infrastructure and their customers spend billions more per year on handsets and service.²³ Thus, CMRS licensees have created significant economic

²⁰ See generally NOI.

²¹ See Hazlett and Spitzer at 41 (“[T]he FCC, rather than seeking to construct experiments, should first recognize the factual record that exists. Exclusively-assigned, flexible-use spectrum rights have demonstrably achieved ... innovative band sharing. . . . This record includes the ability to upgrade technologies, to relocate users, and to effectively economize on the use of radio spectrum. Before embarking on more limited tests, the Commission should seek to incorporate these far-reaching marketplace results in its analysis.”).

²² See CTIA – The Wireless Association®, U.S. Wireless Quick Facts, at http://www.ctia.org/media/industry_info/index.cfm/AID/10323 (last visited Feb. 22, 2011); .

²³ *Id.*

value for consumers. The Commission should not experiment with such a highly valuable and important asset as commercially deployed CMRS spectrum.

If dynamic spectrum access technologies arise that make more efficient use of spectrum, licensees have every incentive to adopt them. Given the high cost of spectrum, licensees will welcome technology that substantially reduces that cost. Indeed, such technology adoption would simply further the industry's efforts to maximize spectrum efficiency.

However, were forced sharing introduced into the exclusive, flexible use licensing regime, licensees would have little if any incentive to deploy spectrally efficient technologies if an underlay or easement is not under the licensee's control, since any future increases in a *primary licensed user's* efficiency yield benefits for the *non-primary* users in the band. Further, licensees face additional economic harms associated with such increased interference, of either decreased service levels or increased costs simply to maintain the same level of service. Finally, the presence of non-primary users and whatever sharing rules the FCC selects would bound the licensee's technology, making it difficult for the licensee to continue to deploy more advanced systems that bring far more agility. Regulation would replace market competition in setting cutting-edge wireless applications. As advanced as a particular government rule may appear when created, it will become difficult to change and will hamper innovation, just as surely as rigid block allocation rules have in the past.

D. Forced Sharing Would Be Unlawful.

As commenters have shown in other proceedings, mandatory sharing of spectrum also would violate CMRS licensees' existing spectrum rights.²⁴ In acquiring (either through an auction or on the secondary market) and developing their spectrum, CMRS licensees obtained investment expectations and both rights and responsibilities associated with those expectations.²⁵ Among those rights is the "right to be protected from interference."²⁶ Forced sharing, as discussed above, would cause interference to licensees' operations, and thereby unlawfully interfere with licensees' investment expectations and their right to protection from harmful interference.

In addition, spectrum auctions establish a contract between the licensee and the federal government.²⁷ Prior to holding an auction, the Commission establishes rules governing the rights and responsibilities of that auction's winners. Auction participants invested tens of billions of dollars to acquire licenses based on those rules, including the Commission's flexible, exclusive use policies and the right to be protected from harmful

²⁴ See, e.g., Sprint Corporation Comments, ET Docket No. 03-237, at 49-51 (filed Apr. 5, 2004); Reply Comments of Verizon Wireless, WT Docket No. 02-135, at 13 (filed Feb. 28, 2003).

²⁵ See, e.g., *Orange Park Florida v. FCC*, 811 F.2d 664, 674 n. 19 (D.C. Cir. 1987); *Reuters Ltd. v. FCC*, 781 F.2d 946, 950 n.5 (D.C. Cir. 1986); *Yankee Network v. FCC*, 107 F.2d 212, 217 (D.C. Cir. 1939).

²⁶ Spectrum Policy Statement, 15 FCC Rcd 24178, 24186 (2000).

²⁷ See, e.g., *Installment Payment Financing Second Reconsideration Order*, 14 FCC Rcd 6571, 6581 n.66 (1999) ("FCC auction rules create a binding mutual obligation between the Commission and the winning bidder as of the close of the auction."); *Nextwave Personal Communications v. FCC*, 200 F.3d 43, 45 (2d Cir. 1999) ("The close of the auction established the FCC's obligation to grant NextWave the Licenses if the company fulfilled statutory eligibility requirements As in contract law more generally, a sale by auction is valid only upon offer and acceptance.").

interference. Licensees who acquired their spectrum through the secondary market similarly relied on these principles. Underlays would unlawfully devalue and impair the auction contract, violating licensees' settled right to maximize the value of the spectrum they bought. Not only would underlays breach the auction contract but they also may be an unconstitutional regulatory taking.

IV. THE COMMISSION CAN PROMOTE THE DEVELOPMENT OF DYNAMIC SPECTRUM ACCESS TECHNOLOGIES WITHOUT MANDATING FORCED SHARING OF ALREADY LICENSED SPECTRUM.

The Commission can continue to promote efficient spectrum use by affirming licensees' exclusive and flexible spectrum rights and by continuing to foster secondary markets. The Commission said in the *Secondary Markets Further Notice* that it intends to "focus on advancing and improving a secondary markets approach to access to spectrum by opportunistic devices."²⁸ To establish a functioning secondary spectrum market, the Commission must give licensees control over third-party opportunistic devices in their licensed spectrum. In contrast, allowing non-primary users' dynamic spectrum access devices to transmit in licensed bands without licensee consent conflicts with one of the goals of the secondary markets initiative. A licensee facing greater interference from non-primary transmitters will have less incentive and ability to resell spectrum. As a prospective lessee, why pay for rights to use spectrum that can be exploited for free or when Commission sharing decisions may render the space crowded? Instead, the Commission's policies should encourage exclusive licensees to mine their

²⁸ *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd. 20604, at ¶ 234 (2003).

spectrum efficiently in order to free up more of their spectrum for lease, thereby promoting additional productive activity.

The Commission's flexible use and secondary markets principles have worked precisely as intended. Wireless licensees have increased the utilization of their spectrum by leasing it to numerous other providers. Verizon Wireless, in particular, has leased portions of its 700 MHz spectrum to rural carriers to expand the availability of 4G LTE services in rural areas. CMRS licensees also utilize more of their spectrum through resale and roaming agreements with Mobile Virtual Network Operators, resellers, and other CMRS operators. Licensees and other businesses in coordination with licensees are deploying picocells, femtocells, and distributed antenna systems that allow CMRS licensees to utilize fully spectrum that otherwise lacks adequate coverage and capacity. CMRS licensees have every incentive to continue such applications. The Commission can foster the development of dynamic spectrum access technologies by continuing to foster secondary markets and allowing licensees to implement whatever technologies the licensee deems most efficient and useful.

In addition, the Commission can continue to experiment with dynamic spectrum access technologies in unlicensed and commons bands. As the Commission notes in the NOI, it recently adopted rules to implement dynamic spectrum use in a number of different spectrum bands including the 5 GHz Unlicensed National Information Infrastructure band, the 3650-3700 MHz band, and the TV White Spaces band.²⁹ The use of dynamic spectrum access technologies in these bands is still developing. The Commission, therefore, should continue to monitor and promote the development and

²⁹ NOI at ¶ 4.

deployment of dynamic spectrum access technologies in these bands. The Commission, however, should not authorize dynamic spectrum access technologies in other bands until such technologies have been proven effective in these spectrum bands. Indeed, late last year, the FCC eliminated the spectrum sensing requirement for the TV White Space devices because sensing technology was not sufficiently mature.³⁰ It would therefore be premature to apply similar technologies to other bands until the technologies are more developed.

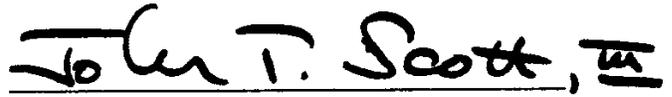
Finally, the Commission can experiment with dynamic spectrum access technologies in spectrum bands with narrow uses that are unsuitable for repurposing to commercial wireless services. Specifically, there are a number of bands that are allocated for limited – but important – purposes. For example, certain bands may only be used during certain times of day or at certain locations. Depending on the type of service being provided, these bands may not be able to be fully cleared for commercial mobile services even if the bands are not realizing their full potential. Dynamic spectrum access technologies could make the rest of the spectrum in these bands available for alternative uses, including commercial wireless services.

³⁰ See *Unlicensed Operation in the TV Broadcast Bands, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Second Memorandum Opinion and Order, FCC 10-174 (Sept. 23, 2010).

V. CONCLUSION

For these reasons, the Commission should maintain its flexible use and secondary markets policies for CMRS spectrum. In addition, the FCC should continue to monitor the development of dynamic spectrum access technologies and consider whether their use in additional bands allocated for unlicensed and limited uses could facilitate more intense spectrum utilization.

Respectfully submitted,

A handwritten signature in black ink that reads "John T. Scott, III". The signature is written in a cursive style and is underlined.

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