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

In the Matter of	)	
	)	
Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, and	)	ET Docket No. 14-165
	)	
Amendment of Part 74 of the Commission's Rules For Low Power Auxiliary Stations in the Repurposed 600 MHz Band and 600 MHz Duplex Gap	)	
	)	
Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auction	)	GN Docket No. 12-268

COMMENTS OF THE TELECOMMUNICATIONS INDUSTRY ASSOCIATION

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SUMMARY

TIA appreciates the Commission's tireless efforts as it continues its steady progress towards implementing the first-of-its-kind voluntary incentive auction. By unleashing the potential of the 600 MHz band for mobile broadband, the incentive auction is a critical part of the Commission's efforts to avoid a "spectrum crunch," ensure that consumers continue to enjoy high-quality service in an era of exploding demand, and ensure that the United States remains a global leader in innovation. These efforts have been evident not just in the landmark *Incentive Auction Report and Order*, but in a host of proceedings the Commission has initiated on various collateral issues.

TIA is concerned, however, that the Commission's proposed technical rules to allow unlicensed white space and wireless microphone devices to operate in close proximity (both in frequency and in distance) to new licensed wireless services would frustrate the main objective of the auction, *i.e.*, to effectively deploy the spectrum for licensed commercial mobile radio services. In considering potential white space operations in close proximity to licensed services – whether in the guard bands, duplex gap, or re-purposed 600 MHz spectrum itself – the Commission must be guided above all by its long-standing principle, specifically reinforced by the Spectrum Act, that such operations may not cause harmful interference to licensed services.

Unfortunately, the rules proposed in the *Notice* have the potential to cause harmful interference, potentially devaluing the spectrum at auction and certainly creating the potential for degraded services and unhappy customers once deployed. Moreover, the Commission cannot mitigate against these possibilities by simply shifting the burden for avoiding harmful interference onto licensees – as would be the effect of the current lack of protection rules in the *Notice*. Nor can it hope that equipment manufacturers will absorb the development cost of

making otherwise unnecessary improvements beyond the current state of the art prior to the commencement of licensed operations.

As the Commission acknowledges, its proposal to allow white space devices to operate in close proximity to licensed wireless services is breaking new ground. For that reason, TIA cautions that any white-space principles and experience the Commission has developed in the broadcast television context cannot be translated into the CMRS context without considerable re-evaluation. And of course, the Commission's task is made even more challenging since 600 MHz wireless operations have not yet started, so there is little possibility for real-world testing at this time – in sharp contrast to the situation that prevailed when white space devices were first allowed in the broadcast television bands. While the Commission has attempted to work through many of the potential issues in the *Notice*, there will surely be unforeseen problems, and for that reason TIA believes that any proposed rules should be scalable, simpler, easier to administer, and easier to enforce that what the Commission has proposed.

TIA does not address wireless microphone operations in these comments, although they too may present potential interference challenges. TIA instead provides focused comments regarding white space device operational challenges.

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TELECOMMUNICATIONS INDUSTRY ASSOCIATION

The Telecommunications Industry Association ("TIA")[1] hereby submits comments to the Federal Communications Commission ("Commission") in the above-captioned proceedings. TIA appreciates the Commission's continued efforts towards conducting the first-of-its-kind voluntary incentive auction – and the tremendous challenge it faces in addressing a myriad of technical and policy issues on an expedited basis. However, TIA has significant concerns regarding several proposals and technical assumptions inherent in the Commission's planned Part 15 rules. TIA urges the Commission to take sufficient time to carefully address and resolve the issues raised below to ensure that the maximum potential of the valuable 600 MHz spectrum is ultimately realized.

[1] TIA is the leading trade association for the information and communications technology ("ICT") industry, representing companies that manufacture or supply the products and services used in global communications across all technology platforms. TIA represents its members on the full range of policy issues affecting the ICT industry and forges consensus on industry standards.

In this docket, careful analysis is particularly important because white space devices operating in close proximity to licensed mobile CMRS services will present different issues from those the Commission has previously grappled with when it allowed unlicensed operations in vacant television channels. As the Commission acknowledges, it "do[es] not currently have rules for white space devices that address operation on a channel immediately adjacent to wireless downlink services."[2] Although the Commission may now have "considerable experience with the development and deployment of … unlicensed devices" in the *television bands*,[3] those rules were developed against the backdrop of active, live incumbent television broadcasting operations.

Meanwhile, any proposed whitespace rules are mandated by statute to protect future 600 MHz CMRS services which *have not yet been deployed*. This significant difference argues for extra caution and a greater degree of scalable protection mechanisms, since simulation data or reliance on experiences developed in other contexts does not necessarily translate to new circumstances. In short, CMRS is not television broadcasting, and protecting mobile CMRS operations from harmful interference will require fresh thinking and analysis not yet evident from the contents of the *Notice*.

I. The Commission's Proposed Rules for Guard Band and Duplex Gap Operations Would Result in Harmful Interference to 600 MHz Licensees.

TIA is concerned that the Commission's proposed rules for guard band and duplex gap operations would result in potentially severe harmful interference to eventual 600 MHz licensees. This is fundamentally at odds with the Commission's longstanding policy – and the Spectrum Act's command – that licensed operations in this band be protected from harmful interference. As described further below, the Commission's proposal to permit interference from

[2] NPRM ¶ 81.

[3] NPRM ¶ 15.

unlicensed white space devices at a distance of up to seven meters is fundamentally inconsistent with most practical applications for CMRS service. Moreover, several assumptions underlying the Commission's calculation are at best questionable, and a corrected analysis may result in a significantly larger interference distance. Finally, questions regarding minimum separation distance calculations may be moot unless the Commission takes adequate steps to ensure that its distance separations can be adequately enforced.

A. Seven Meters of Interference Would Significantly Impair Licensed Operations.

The proposal to allow white space operations in the 600 MHz guard bands is fundamentally predicated upon a calculation that the Commission concedes would result in white space devices causing interference to licensed services at a distance of *seven* meters.[4] This separation threshold for interference significantly exceeds accepted industry practices, and certainly violates the Spectrum Act's command that unlicensed operations must not cause harmful interference to licensed services. Perhaps more important, aside from any laws or technical standards, seven meters of interference would result in consumer frustration under any real-world scenario. As explained further below, TIA believes the "real" number for minimum separation distance, once the calculations are adjusted for more rational assumptions regarding losses and device tolerances, would be much larger than seven meters. However, even seven meters is simply too large to be a basis for justifying a lack of further protections.

Seven meters in context. Seven meters – approximately 23 feet – is a separation distance that is simply unattainable in most dwellings or workplaces. Indeed, 23 feet exceeds the entire length or width of some apartments, let alone a single room. Even in an era of growing homes,

[4] NPRM ¶ 84.

U.S. median home size for *new construction* averaged 2,600 feet in 2013,[5] accounting for a typical home size of, *e.g.*, 36 x 36 feet square on two floors. Meanwhile, the vast majority of Americans presumably live in older and smaller homes. Therefore, allowing seven meters of interference would not simply result in occasionally requiring a consumer to walk a few feet away from any white space device when using their phone. For that reason, the Commission's concession that "there may be concerns" about its proposal[6] is a significant understatement – accepting seven meters of interference would severely degrade or destroy the availability of 600 MHz LTE service within a home or office for most users. Before proceeding any further, the Commission must re-calibrate this fundamental assumption to reflect practical realities.

Minimum separation distance. As a point of reference, when licensed services are adjacent to licensed services, *i.e.*, when both sides have defined protection rights, separation distances of *one to three* meters are more typical, and depend on specifics of the bands at issue in determining interference impact.[7] The minimum separation distance should be based on actual operational device testing, and when it must be based on theoretical calculations alone, a conservative value must be used. In contrast to the distance proposed in the *Notice*, a shorter separation distance of one meter (three feet) would be appropriate to allow different licensed devices to operate in close proximity, and such distances are far more practical in real-world household or office applications. That said, there is simply no basis for *unlicensed* Part 15 devices – which by definition lack any standing protection rights – to benefit from the same distance threshold, let alone be entitled to a much *larger* distance as the Commission now

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[5] U.S. Census Bureau, *Characteristics of New Housing – Highlights*, https://www.census.gov/construction/chars/highlights.html (visited Jan. 28, 2015).

[6] NPRM ¶ 85.

[7] *See, e.g.*, Qualcomm Ex Parte Letter, filed Aug. 5, 2014 in GN Docket No. 12-168, attachment at 4 ("1 meter separation distance per applicable 3GPP specifications") ("*Qualcomm August 2014 Ex Parte*").

proposes. TIA instead recommends that the Commission use the accepted one meter minimum distance separation in its calculations of co-existence with Part 15 unlicensed devices.

Inappropriate burden-shifting. Indeed, much of the Commission's analysis in this regard inappropriately inverts the traditional relationship between licensed and unlicensed services. The Spectrum Act and the Commission's long-standing rules both prohibit the Commission from allowing any unlicensed operations that cause harmful interference to licensed services;[8] the Commission cannot attempt to satisfy this fundamental principle by simply *shifting the burden for avoiding harmful interference onto licensees*. Unfortunately, that is precisely what the Commission attempts to do in explaining away "concerns" regarding its seven-meter threshold. For example, the Commission cites the ability of licensed network operators to "manage operating channels and handset power in noisy conditions," and seems optimistic that interference from unlicensed devices "*may* not rise to the level of harmful interference" since networks might be able to cope when "conditions are less than ideal."[9] Further, it openly expects device manufacturers (and ultimately, consumers of licensed services) to bear the development and production costs "to improve filter technology and designs" in order to mitigate any interference from Part 15 devices.[10]

This misses the mark, for there is simply no basis to convert the obligation of Part 15 devices not to cause harmful interference to licensed services – here, a very specific statutory obligation – into a shared-responsibility requirement. Nor can the responsibility be implicitly shifted to licensed devices by simply not implementing appropriate protections within Part 15 devices, even as the Commission acknowledges that white space devices are unable to know the

[8] Middle Class Tax Relief and Job Creation Act of 2012, Title VI, Pub. L. 112-96, 126 Stat. 156, 201 ("Spectrum Act") at § 6407(e); 47 C.F.R. § 15.5.

[9] NPRM ¶ 85.

[10] *Id.*

location of licensed mobile devices in order to enforce any separation distance.[11] Interference protection must rest squarely on any Part 15 operations, and the burden must fall on those operations to accept any interference from licensed services. Given the basic nature of Part 15, the statutory command, and the basic fact that white space devices have no ability to detect, measure, or enforce their separation distance from licensed mobile devices, the Commission must revise its proposals to reflect fundamental realities.

B. The Technical Assumptions Underlying the Commission's Seven-Meter Calculation Need Revision.

Setting aside the question of what frequency separation and interference distance may be appropriate – or who should bear the burden of avoiding harmful interference – TIA has significant concerns regarding the Commission's calculations that "show a worst case interference distance of less than seven meters."[12] As described above, the Commission's seven-meter calculation is central to its tentative conclusion, rightly or wrongly, that white space devices in the duplex gap and guard band will not cause harmful interference, and in turn to the Commission's further conclusion that additional protection measures are unnecessary.

Requirement to evaluate data. We note that there is significant technical data regarding this issue already in the record of the incentive auction proceeding,[13] and the Commission must address that data – along with any new data now submitted – very carefully before adopting rules. The Commission has not yet done so – in the Notice, it seems to summarily dismiss data from Qualcomm as "purportedly" showing that unlicensed operations could create significant interference problems,[14] while simultaneously crediting data from Broadcom without further

[11] *See* NPRM ¶ 140.

[12] NPRM ¶ 84.

[13] Qualcomm, for example, has submitted numerous studies and analyses in the record of the incentive auction proceeding.

[14] NPRM ¶ 83.

explanation.[15] TIA appreciates that the Commission chose not to "go into the merits of these analyses" in the Notice,[16] but it ***must*** do so before adopting final rules. Given the unquestioned importance of the interference distance issue to this entire proceeding, TIA strongly cautions the Commission that in its final order, "conclusory … statement[s] cannot substitute for a reasoned explanation, for it provides neither assurance that the Commission considered the relevant factors nor a discernable path to which [a reviewing] court may defer."[17] Rather, the Commission must provide a "reasoned justification … sufficient to indicate that it has grappled with" any studies or data,[18] including Qualcomm's data that may be in tension with the Commission's own analysis, or which challenges information provided by others.[19]

The Commission's assumptions. The Commission's preliminary analysis, which yielded a seven-meter interference distance, relies on several technical and operational assumptions, including the following:

- -97 dBm floor for LTE receiver sensitivity based on the 3GPP specification, and an adjacent channel selectivity of 33 dB.
- Assumption of 25 dB *additional* loss over any path loss, including:
    - Additional 10dB for adjacent channel selectivity based on the assumption that LTE devices will *exceed* 3GPP minimum requirements, plus
    - Additional 15 dB of loss "due to a combination of obstructions, body loss and antenna polarization mismatch, etc."
- 7 dB of pass band filter attenuation due to the proposed minimum 3 MHz frequency separation between white space devices and LTE receivers.
- Maximum white space device power (EIRP) of 40 mW and antenna height of 3 meters.

[15] NPRM ¶ 84 n. 127.

[16] NPRM ¶ 83.

[17] *American Radio Relay League v. FCC*, 524 F.3d 227, 241 (D.C. Cir. 2008).

[18] *Id.*

[19] *See* Qualcomm August 2014 Ex Parte, supra n. 7 (challenging Broadcom data).

- 1.5 meter LTE handset height.[20]

Engineering staff at TIA member companies have evaluated these assumptions and have several concerns. Taken together, these concerns would – if adjustments were made to address them – likely result in an interference distance exceeding seven meters by a significant margin. Addressing these concerns in turn:

Exceeding the 3GPP specification by 10dB. The Commission assumes that LTE devices will exceed the 3GPP ACS specification, and bases this assumption upon limited and unmonitored testing done by Broadcom.[21] Broadcom's unmonitored test results were conducted on devices from a different band, and do not represent standard-setting or official results deserving of the unquestioned status accorded to them in the Notice. Broadcom's results are a single data point, not an end result. Before enshrining such an assumption in the rules, actual operational measurements on several device types, from different manufacturing lots, conducted at varying temperatures etc., and then combined into a statistical distribution, would be required. (TIA believes the likely result of such device characterization would actually support the 3GPP specification, rather than undermining it as too conservative). Regardless, the Broadcom data simply cannot serve the authoritative role the Commission assigns to it regarding such a fundamental issue.

Furthermore, while the Commission makes much of the fact that the 3GPP standards contain "minimum" specifications,[22] any margins built into the 3GPP specification do not arise by accident. The 3GPP specification is intended to account for inevitable manufacturing variances across lots, temperature variances, and device tolerances, among other things. Simply assuming that all 600 MHz LTE devices will automatically have 10 dB of "extra" margin across

[20] NPRM ¶ 84.

[21] NPRM ¶ 84 n. 127.

[22] NPRM ¶ 83.

those variations — just because a few samples of 700 MHz devices identified by Broadcom apparently have such margins under narrow operating conditions — is simply not prudent for setting regulatory limits, particularly in a backdrop where 600 MHz licensed operations have not yet started.

Notably, the Commission is not imposing any corresponding requirement in its rules that licensed 600 MHz LTE devices ***must*** perform 10dB better than 3GPP specifications. This is perhaps understandable, since doing so would constitute a more explicit admission that the Commission is requiring licensed devices to provide some level of new interference protection to unlicensed devices. Yet by inserting this factor into its interference distance calculation, the Commission's proposal effectively would accomplish the same result by different, albeit less obvious, means.

Undoubtedly, there will be *some* margin beyond the minimum 3GPP specification simply because adjacent channel selectivity does indeed vary with temperature and manufacturing lots. While 10 dB of margin for all devices across all conditions is an unreasonable assumption, a more reasonable value for purposes of this calculation, in light of indisputable variations among devices and circumstances, would be closer to zero than to 10 dB – perhaps 2 or 3 dB.

Additional 15 dB loss due to obstructions, body loss, antenna polarization, etc. The Commission cites AWS test results from 2008 to assume an additional 15dB of loss, and thus less potential for interference, "due to a combination of obstructions, body loss and antenna polarization etc."[23] However, the operating scenario of most direct concern in this proceeding – *i.e.*, white space devices operating in very close proximity (single-digit or tens of meters) to LTE handset receivers – would not typically feature obstructions between the devices. Moreover,

[23] NPRM ¶ 84 & n. 128 (citing *Advanced Wireless Service Interference Test Results and Analysis*, Federal Communications Commission Office of Engineering and Technology, October 10, 2008).

devices other than handset receivers will undoubtedly be used in the 600 MHz band; a tablet device, for example, will have little head or body loss compared to a handset, and may generally have better antenna performance. Even across handsets, there is a large variation in antenna performance – on the order of 14dB – along with large variations in head and body loss. Antenna polarization mismatch can also very possibly be zero.

In sum, loss parameters will cover a wide range, including a significant possibility of much lower net loss (and higher signal interference potential) that what the Commission assumes. For this reason, a lower "additional" path loss assumption is appropriate. TIA suggests that for the close-proximity situation at issue here, 7 dB would be a more representative assumption. In any case, an assumption of 15 dB of path loss based on the Commission's 2008 study – a study conducted for a different purpose – is not reasonable.

7dB of pass band filter attenuation at 3 MHz frequency separation. Setting aside any concerns about increased interference impact at such a small frequency separation, the Commission's assumption here is simply not viable for real filters. Real filters will have approximately 1 MHz of temperature drift alone, even before accounting for variances in manufacturing lots. Based on the 3 MHz frequency separation the Commission proposes, a value of 0 dB – or at most, 1-2 dB only if filter vendor characterization data supports it – is a more appropriate assumption for filter attenuation (at a 3 MHz offset). While the Commission may simply "expect manufacturers to improve filter technology" prior to networks being deployed,[24] this assumption cannot be a reasonable basis for adopting rules that would allow Part 15 devices to begin operations immediately.

[24] NPRM ¶ 85.

-97 dB LTE receiver sensitivity. The Commission cites the 3GPP standard for "frequencies closest to the 600 MHz band" as its starting point,[25] but the minimum 3GPP requirement for "reference sensitivity level" is very much defined with regard to particular bands.[26] The 600 MHz band (and band plan) has not yet been included in the 3GPP specifications. To be sure, -97 dBm may be a reasonable assumption for a 5 MHz LTE channel size, particularly since that is the current specification for nearby bands 12, 13, 14, 17, and 20. However, other nearby bands have different reference sensitivity levels.[27]

Net results. Taken together, making appropriate revisions to the technical assumptions as described above will result in an interference distance significantly larger than seven meters, and this may have significant effects on the potential viability of white space operations in the guard bands. While perhaps inconvenient as a policy matter, the Commission may not simply make (or adjust) technical assumptions to achieve a pre-ordained conclusion. Rather, it must consider each element of its calculation very carefully, and base its final rules upon sound analysis and the bedrock principle enshrined in the Spectrum Act that licensed operations in the 600 MHz bands *must* be protected from harmful interference caused by Part 15 devices, not vice-versa. If the outcome of this evaluation ultimately requires altering proposed policy decisions – or even re-visiting policy decisions previously announced – then the Commission must do so.

C. The Commission's Proposed Rules May Be Impossible to Enforce.

Regardless of any adjustments made to the interference distance calculations, there is no existing means for white space devices to measure or enforce compliance with any minimum separation distance from licensed mobile devices. Therefore, in a sense, the entire discussion

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[25] NPRM ¶ 83.

[26] *See* 3GPP TS 36.101 v12.6.0 at Section 7.3.1. (rel. Jan. 7, 2015), *available at* http://www.3gpp.org/dynareport/36101.htm

[27] *Id.*

above regarding the appropriate assumptions for a separation distance calculation may be moot. This is a serious problem, and a glaring deficiency in the proposed rules. Either white space devices must – by rule – be equipped with some proven capability to accurately and reliably sense and measure separation distances from licensed mobile devices, *and* have the capability to shut off or switch to lower (television) channels when proximity is detected, **or** they must operate under an indirect proximity detection scheme using base station locations, implying a large protection zone due to the positional ambiguity of licensed mobile devices.

The former approach is not currently feasible, so the latter is the only viable approach the Commission can consider to possibly satisfy the statutory interference protection obligations to avoid harmful interference. Indeed, with licensed base stations being the only knowable, fixed position reference of which the white space database may be aware, and given that licensed mobile devices can be located anywhere within the base station's operational footprint, the Commission has already defined quantitatively a potential solution via its rules for adjacent channel white space devices. Indeed, white space devices in the duplex gap and guard band <u>are</u> adjacent channel devices.

In its current form, the Commission's proposal would simply unleash white space devices nationwide in the duplex gap and guard bands with nothing more than a maximum power level and fixed frequency separation distance. This leaves licensed devices unprotected, and the only interference mitigation adjustment available in the Commission's proposal – a downward adjustment in power level – does not have enough range to cover the distance calculation discrepancies noted earlier while still remaining sufficient for operation. If the Commission's interference assumptions prove to be inaccurate and interference does materialize, the entire burden of proof and enforcement will be (unlawfully) shifted to the licensed device ecosystem and associated licensees. The Commission must address these issues before permitting any

unlicensed operations in the duplex gap or guard bands, and must do so prior to the auction so that bidders may account for plausible impairments and associated mitigation costs.

II. The Commission Must Protect Licensed Services in the Re-Purposed 600 MHz Band.

Ultimately, the basic purpose of the voluntary incentive auction is to make more spectrum available for licensed commercial mobile broadband use. However, the Commission's proposals to allow unlicensed operations in re-purposed spectrum – *i.e.*, spectrum designated for wireless service in the final 600 MHz band plan but excluding the duplex gap and guard band – would, at least as currently proposed, undercut that basic purpose. The basic intent of the Spectrum Act is that the 600 MHz spectrum be made as fully available to licensees as possible, and the Commission must ensure that any interim or stop-gap measures it implements in an attempt to wring every drop of *temporary unlicensed use* from the bands do not undercut the Act's primary objective.

A. Any White Space Operations in the Re-Purposed 600 MHz Band Must Be Limited to the Same Power Level as the Duplex Gap.

The Commission proposes to limit white space device operations in the duplex gap to 40 milliwatts, which it notes is consistent with its proposal to allow 40-milliwatt white space device operation in the guard bands.[28] Yet the Commission then proposes to allow devices operating in the re-purposed 600 MHz band to operate at levels up to 4 watts.[29] Inconsistencies aside, in the Notice the Commission does not squarely address the subject of what any appropriate maximum power level in the re-purposed bands should be. To be sure, white space operations in the remaining *television* bands may operate at a 4-watt power level, but the Commission cannot simply import rules designed for a very different context – protection of television broadcast services – into the very different context of protecting licensed mobile CMRS operations.

[28] NPRM ¶ 31.

[29] NPRM ¶¶ 129-144.

Indeed, there is no technical reason why the Commission should not apply the same lower power limit it may ultimately adopt for the duplex gap – a scenario involving interference to wireless services – to any potential unlicensed operations in the re-purposed 600 MHz band. Of course, this may result in a lowest-common-denominator approach to white space device power levels across the country since different amounts of spectrum will be recovered in different markets. But the Commission may have made its own bed in this regard when it decided in the *Incentive Auction R&O* to allow the continued use of white space devices on *all* spectrum that remains allocated for TV broadcasting, including spectrum with uses that vary by market.[30] Licensed operations should not pay any (further) price for this decision – if any power level is deemed appropriate to permit operations in the duplex gap, then the same level should apply with equal force in the re-purposed spectrum for wireless operations.

B. White Space Operations Should Stop Throughout a License Area Once a Licensee Begins Service.

Following a spectrum auction, CMRS licensees usually have the privilege (and often, the obligation) to provide service throughout their license area, free from interference caused by other devices operating in their band – especially unlicensed devices. Yet in designing a somewhat-opaque protection method that requires licensees to provide a polygon describing their service area – and presumably update this polygon every time a new base station is activated – the Commission frustrates this fundamental expectation. Indeed, nothing in the rules appears to guarantee that a licensee could *ever* see the day when no white space operations are present in its licensed band and area, absent a showing that its base stations covered every square inch of the area. This is inconsistent with all prior Commission actions regarding CMRS licensing, and threatens to harm the potential for future technological innovation by CMRS licensees.

[30] NPRM ¶ 130.

There is a simple fix. Indeed, while the Commission describes its own polygon proposal as a "simple approach" to interference protection,[31] TIA proposes an even simpler method. The Commission should simply prohibit white space operations whenever a licensee begins any operations within its licensed area. (This scenario would, of course, be the normal end result following the completion of the build-out process, as the Commission acknowledges in the *Notice*.) Licensees and database administrators alike would be spared the necessity of contending with complicated and ever-changing interference contours, simply relying instead on the well-defined boundaries of license areas themselves.

Any transactional costs (in unused spectrum) of this approach would be minimal, particularly since use of re-purposed bands will "shrink over time" as licensees build out their networks. Moreover, there is no demonstrated level of spectrum demand or service demand from white space devices to justify extraneous "capacity optimization," particularly when it is defined from the start as a temporary accommodation. For those reasons, the Commission already acknowledges that "there is little benefit in developing complex criteria" to manage use of this spectrum.[32] The Commission should now align its proposed rules with its rhetoric and simply prohibit white space use once a licensee begins operations in its licensed area.

C. The Commission's Proposed Polygon Rules Are Unclear and Difficult to Enforce.

TIA members have significant uncertainties regarding how the polygon approach, as described in the Notice, would actually work in practice. For example, if it proceeds on this course, the Commission should clarify how the polygon applies in scenarios where multiple licensees are building transmitters in the same area. The labeling of some tables in the Notice has also created some confusion among TIA members, *e.g.*, whether separation distances are

[31] NPRM ¶ 134.

[32] NPRM ¶ 134.

from base stations or from the polygons the Commission envisions.[33] The superposition of multiple polygons in different frequency bands by different licensees in adjacent areas also poses a potentially complicated task for database administrators seeking to easily ascertain whether white space operations are possible in a particular location or frequency band.

Indeed, several aspects of the Commission's proposed rules in this regard may be difficult to enforce. The Commission expends great effort developing rules for white space operations in the repurposed 600 MHz spectrum, encompassing variable heights, different power levels, and different resulting separation distances.[34] In TIA's view, enforcement of these multitudinous restrictions by a database administrator will be extremely cumbersome, and unnecessarily so. For that reason, the Commission should seek to consolidate its proposed protections to the greatest extent possible, particularly in light of the fact that use of the re-purposed band is expected to shrink over time in any event. To that end, TIA observes that if the Commission adopts our proposal to limit power levels for operations in the re-purposed 600 MHz spectrum to the same level as that ultimately adopted for the guard bands, *see* § II-A *supra*, the administration and enforcement process for this particular aspect of non-duplex-gap, non-guard-band, white space rules would likely be greatly simplified.

[33] *See* NPRM ¶ 138.

[34] NPRM ¶¶ 134-144.

III. Conclusion

TIA continues to strongly support the Commission's efforts in working through the myriad of policy issues regarding the incentive auction. However, the proposed rules in the Part 15 Notice would potentially frustrate the primary goal, established by Congress, of repurposing the 600 MHz band for licensed mobile broadband services. For that reason, TIA urges the Commission to carefully consider all relevant data and analyses before moving forward, and to adopt policies consistent with the recommendations above.

Respectfully submitted,

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