

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

In the Matter of)	
)	
LightSquared Subsidiary LLC)	IB Docket No. 11-109
)	
Request for Modification of its)	
Authority for an Ancillary Terrestrial)	SAT-MOD-20101118-00239
Component)	
)	

REPLY COMMENTS OF DEERE & COMPANY

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SUMMARY

LightSquared complains in elaborate detail how the Commission's proposed actions supposedly would injure LightSquared and its investors, apparently dashing their expectations for a windfall profit from the conversion of satellite spectrum to coveted terrestrial mobile spectrum without having to pay the auction fees that CMRS carriers have had to pay, and how unfair this supposedly would be to LightSquared and its investors. This convoluted view improperly suggests that the Commission's role is as an advocate for LightSquared's private interests rather than to protect the broad public interests at stake in this proceeding.

In its 425+ page filing, LightSquared simply ignores the inconvenient truth that it has not met the condition in the Bureau's January 26, 2011 *Conditional Waiver Order* that interference to the Global Positioning System ("GPS") must be resolved before it may provide any commercial ATC service. On this basis alone, the International Bureau's proposed rescission of the *Conditional Waiver Order* and indefinite suspension of LightSquared's ATC authority are appropriate and necessary exercises of the Commission's public interest authority to prevent the severe harm that LightSquared's proposed terrestrial network would cause to the GPS.

In the face of comprehensive, credible, and overwhelming technical evidence of interference, LightSquared unleashes a volley of arguments condemning the extensive technical testing process, rehashing unorthodox technical theories that have been considered and rejected, denigrating the interference objections of virtually the entire GPS sector (government and civilian), and asserting non-existent property, contract, and other rights. LightSquared's protestations address everything but the Commission's authority and obligation to safeguard the public interest.

The Bureau's proposed actions are entirely warranted under the Commission's obligation to protect the *public interest* as opposed to private interests, in this case those of LightSquared and its investors. The Commission's role in this proceeding is not, as LightSquared would have it, merely to put on blinders and narrowly determine whether GPS receivers are, or are not, entitled to any protection against "overload" transmissions under the Table of Frequency Allocations and the existing terms of the LightSquared license. The Communications Act requires that the Commission promote the public interest at all times, and gives it power to modify licenses, "if in the judgment of the Commission such action will promote the public interest, convenience, and necessity."

In light of the test results, it is abundantly clear that allowing any terrestrial operations in MSS frequencies would cause severe harm to the public interest, which far outweighs the purported benefits of LightSquared's network. While no party questions the need for better broadband coverage, the public interest would not be served if critical national infrastructure – the GPS system – is sacrificed to LightSquared's plan.

In an effort to concoct a set of rights that do not exist, LightSquared continues to present a distorted and self-serving recitation of the history of MSS/ATC that ultimately misrepresents its rights to use its satellite spectrum for high power terrestrial mobile service that would cause devastating interference to most classes of GPS receivers. The Commission did not and has not reallocated the L-Band spectrum for terrestrial mobile use as it has done in the similarly situated 2 GHz MSS spectrum. This distorted view also runs counter to longstanding spectrum management principles – currently reflected in the L-band allocation in the Table of Allocations – that strongly favor clustering services with like technical characteristics together. LightSquared's one-sided interpretation of its license rights also flies in the face of repeated Commission state-

ments and actions, including the establishment of rigorous gating criteria designed to prevent the back-door conversion of L-band satellite spectrum to terrestrial mobile uses, indicating that ATC was not intended to develop into a ubiquitous terrestrial mobile network overtaking the primary satellite purpose.

The proposed actions are completely aligned with the public interests at stake in this proceeding. GPS technology has delivered revolutionary benefits to the country's military capability, public safety operations, aviation system, and agricultural sector, among others. In agriculture alone, the expanded use of GPS is the most significant single technological advancement for American farm equipment in the past 15 years. Consumer-based GPS technology has led to a multitude of GPS applications pervasive in virtually every aspect of modern American life. Commercial applications of GPS technology generate substantial economic benefits in this country; direct economic benefits on commercial GPS users are estimated to be \$67.6 billion per year in the United States alone. And, for more than two decades, GPS has been consistently recognized at the highest levels of our government as a critical national resource that merits protection and investment.

Further, there is no merit to any of LightSquared's desperate attempts to spin novel theories of contract or constitutional law to overcome the fatally damaging series of comprehensive technical tests. No "contract" was ever formed between LightSquared and the Commission with respect to LightSquared's rights to operate a ubiquitous terrestrial network on MSS spectrum and therefore the Bureau's proposed actions cannot constitute a breach of any obligation on the part of the Commission. Further, in accordance with well-settled law, LightSquared does not derive a property right from its FCC license and therefore cannot claim that the proposed Commission actions would be an impermissible "taking" under the Fifth Amendment. Finally, neither the

vacatur of the *Conditional Waiver Order* nor the partial suspension of LightSquared's ATC authority would violate the due process, equal protection or bill of attainder provisions of the Constitution.

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REPLY COMMENTS OF DEERE & COMPANY

Deere & Company (“Deere”), by its undersigned attorneys, and pursuant to the February 15, 2012 Public Notice in the above-captioned docket,¹ hereby submits its reply comments on the International Bureau’s tentative conclusions outlined in the Public Notice that LightSquared has not met the requirements of the *Conditional Waiver Order*,² that there is no realistic prospect that it will be able to do so in any reasonable period of time, and that therefore the conditional waiver of the satellite integration requirement should be rescinded and LightSquared’s Mobile Satellite Service (“MSS”) license should be modified to suspend its Ancillary Terrestrial Authority (“ATC”) indefinitely. For the reason discussed below, such proposed actions are appropriate and necessary.

I. INTRODUCTION

The International Bureau’s proposed rescission of the *Conditional Waiver Order* and indefinite suspension of LightSquared’s ATC authority are appropriate and necessary exercises of

¹ *International Bureau Invites Comment on NTIA Letter Regarding LightSquared Conditional Waiver*, Public Notice, IB Docket No. 11-109, DA 12-214 (rel. Feb. 15, 2012) (“*Feb. 15th Public Notice*”).

² *In the Matter of LightSquared Subsidiary LLC Request for Modification of its Authority for an Ancillary Terrestrial Component*, Order and Authorization, SAT-MOD-20101118-00239 (rel. Jan. 26, 2011) (“*Conditional Waiver Order*”).

the Commission's public interest authority to prevent the severe harm that LightSquared's proposed terrestrial network would cause to the Global Positioning System ("GPS"). None of LightSquared's numerous but predictable objections merits a different course. It is telling that other than LightSquared's input, the comments revealed little substantive objections to, and in fact showed significant support for, the Bureau's proposed actions. In its 425+ page filing,³ LightSquared simply ignores the inconvenient truth that it has not met the condition in the Bureau's January 26, 2011 *Conditional Waiver Order*⁴ that GPS interference issues must be resolved before it may provide any commercial ATC service. In the face of comprehensive and credible damning technical evidence of interference, LightSquared unleashes a volley of arguments attacking the Commission's authority and obligation to safeguard the public interest, attacking the extensive technical testing process, rehashing unorthodox technical theories that have been considered and rejected, denigrating the interference objections of virtually the entire GPS sector (government and civilian), and asserting non-existent property, contract, and other rights.

II. STATEMENT OF FACTS

LightSquared continues to present a distorted and self-serving recitation of the history of MSS/ATC that ultimately misrepresents the rights of LightSquared to use its satellite spectrum for high power terrestrial mobile service that would cause devastating interference to most classes of GPS receivers. Laced throughout LightSquared's voluminous comment filing is its hackneyed story that, for more than a decade, it had planned to use its satellite spectrum for a

³ Comments in Opposition of LightSquared Inc., filed March 16, 2012 ("*LightSquared Comments*").

⁴ *Conditional Waiver Order* ¶ 43 (petitions for recon. and for review pending).

ubiquitous LTE network⁵ and that the Commission effectively reallocated frequencies to allow this when it authorized MSS licensees to use terrestrial ATC networks as *ancillary* “gap-fillers” to supplement their satellite services where MSS signals were weak or blocked. LightSquared also suggests that the GPS community somehow failed to anticipate that LightSquared would attempt to turn the MSS/ATC concept on its head or that the Commission would waive the satellite integration requirements and therefore, in LightSquared’s distorted view, no affected GPS stakeholder can now be heard to complain.⁶ Finally, LightSquared argues that, regardless of the facts, the Commission has no authority to act in this circumstance in the public interest to prevent widespread disruption of heavily-used GPS applications.⁷

While Deere sets forth below why the Commission has ample discretion and, indeed, the responsibility, to act to protect the public interest by preventing interference to GPS, at the outset, Deere strongly disagrees with LightSquared’s mischaracterization of the Commission’s orders and rules. LightSquared ignores the fact that the Commission expressly refrained from reallocating L-Band spectrum for terrestrial mobile use, repeatedly explained that ATC was not intended to develop into a terrestrial mobile network, and was careful to adopt a scheme specifically designed to *prevent* ATC from becoming a ubiquitous terrestrial CMRS network overtaking the primary satellite purpose.

The L-band spectrum that is at issue here is, and always has been, allocated to the Mobile Satellite Services. LightSquared blithely points to the addition of footnote US380 in the Part 2

⁵ See, e.g., *LightSquared Comments* at 23-33, 65-69.

⁶ See *id.* at 47 (LightSquared has no legal responsibility for interference harm where “the Commission did not adopt – and the GPS industry did not insist upon” – technical limits to prevent interference.).

⁷ *Id.* at 50-52.

Table of Allocations as definitive evidence that the L-Band was reallocated to “MSS/ATC.”⁸ However, this footnote falls far short of modifying the primary service designation to reflect a new and additional primary or co-primary allocation; it only points to ancillary use in an integrated network subject to ATC limitations all within the primary satellite service allocation.⁹ Recently, the Commission expressly acknowledged that footnote US380 *cannot* be considered an allocation for terrestrial service in the U.S. Table of Allocations.¹⁰ Recognizing that a new co-primary allocation would need to be added to the Table of Allocations to permit a ubiquitous terrestrial high power network to develop using S-band MSS spectrum, notwithstanding footnote US380, the Commission took steps to reallocate the S-band MSS spectrum to include co-primary terrestrial mobile operations. The Commission has yet to take a similar reallocation step with respect to the L-Band.

⁸ *Id.* at 11-12. Footnote US380 states only that that MSS licensees may operate an ancillary terrestrial component “in conjunction with its MSS network subject to the Commission’s Rules for ancillary terrestrial component and subject to all applicable conditions and provisions of its MSS authorization.” 47 C.F.R. § 2.106 n. US380.

⁹ When adopting ancillary service rules, the Commission expressly rejected the idea of creating a co-primary allocation for terrestrial service, explaining that “[d]ue to our decision today that ATC networks are to be closely tied to a licensee’s MSS network operations from a technical and operational standpoint, and our decision to allow an MSS licensee to operate an ATC network only on its frequency assignments for its satellite network, we agree with the commenters that adding footnotes to the U.S. Table of Allocations for the respective MSS bands is sufficient to permit ATC operations in the 2 GHz MSS, L-band and Big LEO MSS allocations.” *In the Matter of Flexibility for Delivery of Communications by Mobile Satellite Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands; Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands*, Report and Order and Notice of Proposed Rulemaking, 18 FCC Rcd 1962 ¶ 236 (2003) (“2003 ATC Order”).

¹⁰ See *In the Matter of Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1625.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz*, Notice of Proposed Rulemaking and Notice of Inquiry, Docket No. 10-142, ¶ 11 (2010). In considering whether and how to permit licensing of terrestrial services in the 2 GHz MSS band, the Commission specifically proposed to amend the Table of Allocations to reflect a new co-primary entry for S-band MSS that would allow use of that spectrum for stand-alone terrestrial use. There, the Commission stated that adding co-primary status in the Table of Allocations was “a *precondition* for more flexible licensing of terrestrial services within the band” beyond ATC. See *id.* ¶ 2 (emphasis added).

Deere's objection to LightSquared's disingenuous attempt at portraying the addition of footnote US380 as a reallocation of the L-Band goes beyond a concern for process and formality. A view that footnote US380 authorizes high powered terrestrial operations in the L-Band would also contradict longstanding regulatory principles of spectrum management that strongly favor clustering services with like technical characteristics together, and disfavor allowing dissimilar services to occupy the same or nearby spectrum. Much like common sense zoning laws that ensure heavy industry oil refineries are not situated next to residential neighborhoods and schools, Commission rules and policies have not authorized operations with transmissions many orders-of-magnitude more powerful than nearby very low-power satellite signals.¹¹ In the absence of an allocation permitting ubiquitous terrestrial operations on the L-band, LightSquared's LTE proposal must be considered nothing more than a nonconforming use.¹²

LightSquared also ignores the repeated clear and unambiguous Commission statements and actions confirming that the ATC rules were never meant to support nationwide, stand-alone terrestrial-only networks:

¹¹ See *In the Matter of LightSquared Subsidiary LLC Request for Modification of its Authority for an Ancillary Terrestrial Component*, Petition for Reconsideration of Deere & Company, SAT-MOD-20101118-00239, 5-6 (filed Feb. 25, 2011) ("*Deere Petition for Reconsideration*").

¹² See *id.* at 13-15 (Bureau erred in granting even conditional waiver to nonconforming network). Moreover, a final grant of the waiver would impermissibly result in a *de facto* reallocation of the L-band satellite spectrum for terrestrial uses contrary to Commission precedent recognizing that questions of spectrum policy regarding the best use of particular spectrum must be handled in reallocation rulemaking proceedings and not in the context of a narrow waiver. See *In the Matters of Rulemaking to Amend Part 1 and Part 21 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band and to Establish Rules and Policies for Local Multipoint Distribution Service; Applications for Waiver of the Commission's Common Carrier Point-to-Point Microwave Radio Service Rules; Suite 12 Group Petition for Pioneer's Preference; University of Texas-Pan American Petition for Reconsideration of Pioneer's Preference Request Denial*, Notice of Proposed Rulemaking, Order, Tentative Decision and Order on Reconsideration, 8 FCC Rcd 557 ¶ 53 (1993) (denying applications for waiver on ground that grant would "amount to a *de facto* reallocation of the 28 GHz band"), *aff'd*, *Melcher v. FCC*, 134 F.3d 1143, 1164 (D.C. Cir. 1998) ("[T]he waivers raised common policy questions, involving both the best use of the 28 GHz band and the additional rules that would be needed to govern new uses of that band, questions that would best be addressed in a rulemaking proceeding.").

- When ATC was first introduced, the Commission explained that “ancillary” terrestrial service “refer[s] *strictly* to services provided by MSS operators that are integrated with the satellite network, use assigned MSS frequencies, and are *provided for the purpose of augmenting signals in areas where the principal service signal, the satellite signal, is attenuated.*”¹³
- In accordance with this fundamental policy, LightSquared’s predecessor assured the Commission that: “MSV will *not* operate a terrestrial-only system; rather, terrestrial operations will *only* supplement the satellite service in urban and indoor environments with terrestrial extensions.”¹⁴
- In its 2003 order adopting the initial ATC rules, the Commission stated without qualification: “We will authorize MSS ATC subject to conditions to ensure that the added terrestrial component *remains ancillary* to the principal MSS offering. *We do not intend, nor will we permit, the terrestrial component to become a stand-alone service.*”¹⁵

The Commission also recognized that allowing ATC to become a full-blown ubiquitous terrestrial network would discriminate against CMRS providers who had been required to pay billions of dollars for spectrum at auction, while MSS providers, such as LightSquared, would have received terrestrial spectrum for free.¹⁶ The Commission carefully distinguished the very

¹³ See *In the Matter of Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-band, and the 1.6/2.4 GHz Band*, Notice of Proposed Rulemaking, 16 FCC Rcd 15532, ¶ 30 (2001) (“*ATC NPRM*”) (emphasis added). With ATC, the Commission said, “[t]he satellite path would be the preferred communications link, but if the user’s satellite path is blocked, the communications link would be sustained via the fill-in base stations.” *Id.* ¶ 15.

¹⁴ Comments of Motient Services, Inc., TMI Communications and Company, Limited Partnership, and Mobile Satellite Ventures Subsidiary LLC, IB Docket 01-185, ET Docket No. 95-18, at 23 (filed Oct. 22, 2001) (emphasis added).

¹⁵ *2003 ATC Order* ¶ 1.

¹⁶ AT&T and other cellular carriers specifically raised concerns that MSS providers would use their ATC authority to provide terrestrial services with spectrum obtained at no cost in competition with the carriers who were being required to pay billions of dollars for spectrum at auction. In response, the Commission explicitly reassured that ATC providers were not being set up to compete with them, explaining that because of the strict requirement that ATC service be ancillary to, and integrated with, the primary satellite service, the cost and reach of ATC would be very different, and so “cellular and MSS ATC are expected to have different prices, coverage, product acceptance and distribution . . . [and] would be operating in predominantly different market segments We also do not believe that MSS, even with ATC, will be directly competitive with the terrestrial services offered by CMRS carriers.” *Id.* ¶¶ 39, 229 (“[T]he operating, functional, and cost characteristics of MSS with ATC are sufficiently different from CMRS terrestrial services that we do not believe they will be close substitutes for each other for the vast majority of customers.”).

limited satellite-integrated MSS/ATC service from CMRS terrestrial service and, on that basis, declined to require that ATC spectrum be auctioned.

To prevent the ATC rules from being used as a backdoor means of providing primarily or solely terrestrial service (which is precisely what LightSquared is attempting to do), the *2003 ATC Order* established rigorous satellite integration “gating criteria.” Later modifications in the *2005 ATC Order* and subsequent orders giving MSS providers flexibility to determine the specifics of ATC implementation to assist their particular satellite networks, contrary to LightSquared’s interpretation, did not abrogate the gating criteria or the Commission’s fundamental commitment that ATC networks were to be strictly *ancillary* to the satellite operations.

Despite LightSquared’s suggestions that the Commission long ago abandoned the gating criteria, they remain firmly in place today. That is why the Bureau took the step of granting a conditional waiver of the integration requirement in the January 2011 *Conditional Waiver Order*. The continuing existence of the gating criteria maintains the incentive of MSS licensees to avoid in-band interference with and disruption to the satellite systems that are at the mandatory core of their licenses.¹⁷ Since the grant of a conditional waiver to LightSquared, extensive laboratory and field testing have demonstrated that its proposed network – both in its original and modified forms – will cause unacceptable interference to GPS receivers in a wide variety of applications.¹⁸

¹⁷ But if this requirement is waived, as was done for LightSquared, this protective incentive vanishes. The MSS provider free to use its spectrum for terrestrial-only networks instead has a powerful incentive to increase the power and ubiquity of its terrestrial transmissions, even if such transmissions interfere with the now “ancillary” satellite system. Thus the waiver needed to be conditioned on other protective measures, as the FCC did here, forbidding LightSquared to commence commercial ATC operations under the waiver until it provides satisfactory assurances that its terrestrial network would not interfere with GPS-based services.

¹⁸ Those results were developed first through the Technical Working Group (“TWG”), co-led by LightSquared, and involving more than 100 participants, and more recently, through the National Space-Based Positioning, Navigation and Timing Systems Engineering Forum (“NPEF”) and the Federal Aviation Administration (“FAA”). Comments of Deere & Company, IB Docket No. 11-109, SAT-MOD-20101118-00239, 5-6 (filed Mar. 16, 2012) (“*Deere Comments*”).

The Bureau has the authority and indeed the responsibility to rescind the conditional waiver and to suspend LightSquared's ATC authority to protect the public interest, convenience and necessity¹⁹ and nothing in the MSS/ATC orders or in the Communications Act suggests otherwise.

III. THE FCC HAS BROAD DISCRETION AND RESPONSIBILITY TO MAKE SPECTRUM MANAGEMENT DECISIONS THAT PROTECT THE PUBLIC INTEREST, CONVENIENCE, AND NECESSITY

The most remarkable feature of LightSquared's Comments in this docket is that the company managed to write 124 pages discussing in elaborate detail how the Commission's proposed actions supposedly would injure LightSquared and its investors, and how unfair this supposedly would be to LightSquared and its investors, and yet barely even mentioned the Commission's obligation to protect the *public interest* as opposed to those private interests of LightSquared and its investors. When it did briefly address the public interest, it merely touted the anticipated benefits of its own network, and urged the Commission to promote private investment in such networks, as if no other possible use of the radio spectrum existed.²⁰ To LightSquared, apparently, GPS service is a mere annoyance and an unwelcome eavesdropper on "its" spectrum, rather than a valuable and widely-used application of scarce radio frequencies that has immense public benefits, as discussed in Section IV.A, below.

The Commission's role in this proceeding is not, as LightSquared would have it, merely to determine whether GPS receivers are, or are not, entitled to any protection against "overload"

¹⁹ LightSquared suggests that the proposed actions would be such a "dramatic" reversal of past Commission policy that they fall outside the Bureau's delegated authority. *LightSquared Comments*, at 69-75. As shown above, LightSquared's characterization of past Commission actions concerning terrestrial use of MSS frequencies is highly distorted. Moreover, the Bureau's proposal is far from a "change in course" but represents the necessary and foreseeable response to LightSquared's inability to satisfy the conditions that the Bureau itself adopted in the *Conditional Waiver Order*. If the Bureau's imposition of those conditions was within its delegated authority (as LightSquared certainly appears to have believed it was, as it stated in its opposition to multiple applications for review), then determining the consequences of failure to satisfy those same conditions should also be within the Bureau's authority.

²⁰ *Id.* at 95-105.

transmissions under the Table of Frequency Allocations and the existing terms of the Light-Squared license. The Supreme Court long ago rejected the position, now advocated by Light-Squared, that the Commission should be a passive enforcer of static, vested interests in radio frequencies. “The Communications Act is not designed primarily as a new code for the adjustment of conflicting private rights through adjudication. Rather it expresses a desire on the part of Congress to maintain, through appropriate administrative control, a grip on the dynamic aspects of radio transmission.”²¹

The Commission has a responsibility to regulate the use of radio spectrum “as public interest, convenience, and necessity requires[.]”²² In so doing, it must effectuate the purpose of Congress, “to maintain the control of the United States over all the channels of radio transmission; and to provide for the use of such channels, but not the ownership thereof, by persons for limited periods of time, under licenses granted by Federal authority[.]”²³ Starting soon after adoption of the Communications Act of 1934, and continuing to the present day, the courts have emphasized the broad discretion and authority of the FCC to protect the public interest. In the words of Justice Frankfurter:

In granting or withholding permits for the construction of stations, and in granting, denying, modifying or revoking licenses for the operation of stations, “public convenience, interest, or necessity” was the touchstone for the exercise of the Commission’s authority. While this criterion is as concrete as the complicated factors for judgment in such a field of delegated authority permit, it serves as a supple instrument for the exercise of discretion by the expert body which Congress has charged to carry out its legislative policy. . . Underlying the whole law is recognition of the rapidly fluctuating factors characteristic of the evolution of broadcasting and

²¹ *FCC v. Pottsville Broadcasting Co.*, 309 U.S. 134, 138 (1940).

²² 47 U.S.C. § 303.

²³ 47 U.S.C. § 301.

of the corresponding requirement that the administrative process possess sufficient flexibility to adjust itself to these factors.²⁴

Significantly, the Supreme Court also has instructed that the “public interest, convenience, and necessity” is a relative test, not an absolute one; that is, the Commission must balance and, when necessary, choose among contesting potential uses of the spectrum:

The facilities of radio are limited and therefore precious; they cannot be left to wasteful use without detriment to the public interest. “An important element of public interest and convenience affecting the issue of a license is the ability of the licensee to render the best practicable service to the community reached by his broadcasts.” *FCC v. Sanders Radio Station*, 309 U.S. 470, 475. The Commission’s licensing function cannot be discharged, therefore, merely by finding that there are no technological objections to the granting of a license. . . . Since the very inception of federal regulation by radio [*sic*], comparative considerations as to the services to be rendered have governed the application of the standard of “public interest, convenience, or necessity.” See *Federal Communications Comm’n v. Pottsville Broadcasting Co.*, 309 U.S. 134, 138 n. 2.

The avowed aim of the Communications Act of 1934 was to secure the maximum benefits of radio to all the people of the United States. To that end Congress endowed the Communications Commission with comprehensive powers to promote and realize the vast potentialities of radio. Section 303 (g) provides that the Commission shall “generally encourage the larger and more effective use of radio in the public interest”; . . . and subsection (r) empowers it to adopt “such rules and regulations and prescribe such restrictions and conditions, not inconsistent with law, as may be necessary to carry out the provisions of this Act.”²⁵

The key issue facing the Commission in this proceeding is not to determine what rights and priorities were or were not granted to LightSquared in past decisions, but to determine whether it is in the public interest *prospectively* to permit uses of the MSS frequencies that would

²⁴ *Id.* at 137-138. *Accord*, *Nat’l Broadcasting Co. v. United States*, 319 U.S. 190, 216 (1943); *FCC v. WNCN Listeners’ Guild*, 450 U.S. 582, 594 (1981); *National Assoc. for Better Broadcasting v. FCC*, 849 F.2d 665, 666 (D.C. Cir. 1988) (“Title III of the Act establishes a broad grant of authority to the Commission to regulate radio . . . communications . . .”).

²⁵ *Nat’l Broadcasting Co.*, 319 U.S. at 216-17.

impair the public’s ability to use other frequencies in beneficial ways. One can spend hours searching LightSquared’s lengthy comments in this proceeding in vain for any recognition that the Commission must *balance* the touted benefits of its proposed, but speculative, future terrestrial use of MSS frequencies against the extensive, valuable, and nearly ubiquitous existing applications of GPS that are directly used by many millions of Americans and indirectly benefit every citizen of the United States.²⁶

As discussed in the preceding section, LightSquared’s one-sided view of the regulatory history of its license and its ATC authorization, and of its legal standing *vis-à-vis* that of GPS receiver manufacturers, marketers, and users is highly incomplete and misleading. But even if (hypothetically) LightSquared were correct in every detail about its existing license terms and in its claims that GPS receivers have no right to “listen” on MSS frequencies, it would make no difference to the Commission’s power and responsibility to consider whether its proposed uses of those MSS frequencies continue to best serve the public interest.

LightSquared’s only grudging recognition that its use of the publicly-owned radio spectrum might conceivably be subject to some public interest concerns is in the context of its argument that it is too late for the Commission to consider those concerns now. “To be sure, the Commission can take the existence of such [GPS] devices into account when it sets the rules for new services[.] . . . In the case of ATC operations in the MSS/ATC Band, that evaluation happened almost a decade ago.”²⁷ As already shown, LightSquared’s view of the past is highly

²⁶ LightSquared does argue at length, of course, that its proposed services would benefit the public, *LightSquared Comments* at 2-8, 95-105, but it studiously avoids any discussion of the countervailing harms it could cause. To the contrary, it baldly asserts that “LightSquared has no legal responsibility” for any harm that may be caused by its proposed terrestrial operations to users of other services. *Id.* at 46. That assertion is off the mark; it is not a question of LightSquared’s responsibility, but of the Commission’s responsibility to protect the public.

²⁷ *Id.* at 46-47.

distorted; but, again, even if it were accurate, this would make no difference to the Commission's authority. LightSquared's argument falsely presumes that the Commission's hands are tied once it authorizes a particular use of spectrum, and no matter what unforeseen consequences may later arise it can do nothing to address them. This would be an absurd situation. It is like arguing that if a highway agency authorized a left-turn signal at a particular intersection, and later found that there was a high danger of pedestrian accidents at that intersection, it could not alter the signal to prevent pedestrians from being run over in the future. In essence, LightSquared is arguing that its private interests as a licensee should take priority over the public interest.

The Communications Act, however, requires that the Commission promote the public interest at all times, and gives it power to modify licenses, "if in the judgment of the Commission such action will promote the public interest, convenience, and necessity."²⁸ This provision reserves to the Commission "considerable regulatory power and authority" over existing licenses.²⁹ As the Court of Appeals for the District of Columbia Circuit has explained,

Section 316 grants the Commission broad power to modify licenses; the Commission need only find that the proposed modification serves the public interest, convenience and necessity. No doubt licensees have a strong and legitimate interest in administrative repose, *see, e.g.*, 47 U.S.C. § 405(a), but the Congress gave the Commission the authority in section 316 to override that interest if doing so serves the public interest, convenience and necessity. *See id.* at § 316(a)(1); *Greater Boston Television Corp. v. FCC*, 463 F.2d 268, 287 (D.C. Cir. 1971) ("administrative finality is subject to certain powers conferred in the FCC by the Act for appropriate cases" such as license modification power conferred by section 316).³⁰

²⁸ 47 U.S.C. § 316(a)(1).

²⁹ *Mobile Relay Associates v. FCC*, 457 F.3d 1, 12 (D.C. Cir. 2006). *See also Peoples Broadcasting Co. v. U.S.*, 209 F.2d 286, 288 (D.C. Cir. 1953) (FCC may modify a license over the licensee's objection).

³⁰ *Cal. Metro Mobile Commc'ns, Inc. v. FCC*, 365 F.3d 38, 45 (D.C. Cir. 2004) (some citations omitted or abbreviated) ("*CMMC*").

Of course, the Commission may not modify a license arbitrarily or capriciously, but (as with any other administrative order) its decision must be based rationally on the record before it. As we discuss in Sections IV and V, below, the record in this case provides ample justification for the Commission’s proposed modification. Moreover, the Commission has protected LightSquared’s procedural rights by giving it notice of the proposed modification and allowing it to object within 30 days,³¹ and it should continue to observe those procedural protections in acting upon LightSquared’s objections. But adherence to correct administrative procedure is a different matter from LightSquared’s erroneous and absurd argument that the Commission has no substantive power to correct the unintended or unforeseen consequences of past decisions. Although license modifications are not commonplace, which is appropriate in light of the interest in “administrative repose” mentioned by the *CMMC* court, the Commission has not hesitated to invoke its modification authority in cases where the circumstances justify it.³²

Further, the Commission is not bound by its past determinations of what spectrum allocation will best serve the public interest, whether those determinations were made a decade ago as LightSquared claims, or only last year. “[A]n agency’s view of what is in the public interest may change, either with or without a change in circumstances. But an agency changing its course must supply a reasoned analysis.”³³

³¹ 47 U.S.C. § 316(a).

³² See, e.g., *Gemini Int’l, Inc. & Sprint Nextel Mediation*, 23 FCC Rcd 265 (PSHSB 2008); *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, 22 FCC Rcd 15289, 15339 ¶131 (2007); *Improving Public Safety Communications in the 800 MHz Band*, 20 FCC Rcd 16015, 16043-44 ¶ 64 (2005).

³³ *Motor Vehicle Mfrs. Ass’n of U.S., Inc. v. State Farm Mut. Auto Ins. Co.*, 463 U.S. 29, 57 (1983) (quoting *Greater Boston Television Corp. v. FCC*, 444 F.2d 841, 852 (D.C. Cir. 1971)). *Accord FCC v. Fox Television Stations*, 556 U.S. 502 (2008) (agency changing its policy must demonstrate that the new policy is permissible under the statute and that there are good reasons for it, but not that the reasons for the new policy are better than the reasons for the old one).

Although LightSquared tries mightily to paint this proceeding as presenting merely a question of its private rights and interests in opposition to the private rights and interests of GPS receiver manufacturers, far more is actually at stake. The Commission's responsibility is not to protect *either* of these competing sets of private interests, but rather to protect the broader interests of the public. No one disputes that both GPS services and mobile voice and data services are beneficial to the public, along with many other potentially beneficial uses of radio frequencies. Here, as in so many other cases, however, there is not enough spectrum to permit every possible service to be used to the maximum possible extent. The Commission must therefore consider whether the incremental benefits promised by LightSquared's proposed terrestrial service outweigh the potential impairment of the benefits of GPS services and applications, *not* whether LightSquared's private claims to particular frequencies give it vested rights as opposed to other users. As we show in the following sections, the potential harms caused by MSS/ATS operation far outweigh the claimed benefits.

IV. BY RESCINDING THE CONDITIONAL WAIVER AND SUSPENDING LIGHTSQUARED'S ATC AUTHORITY THE FCC IS REASONABLY EXERCISING ITS AUTHORITY TO PROTECT THE PUBLIC INTEREST IN PREVENTING INTERFERENCE TO GPS SIGNALS

A. GPS's Innovations Provide Critical Public Safety and Economic Benefits to U.S. Citizens in Myriad Applications

LightSquared has tried to justify its proposal by a reflexive appeal to the need to increase national broadband coverage.³⁴ No one questions the need for better broadband coverage,³⁵ but

³⁴ *LightSquared Comments* at 4-5.

³⁵ The purported public interest benefits of LightSquared's planned service are laudable but LightSquared is wrong in suggesting that its plan is the only means of achieving these goals and that without LightSquared, consumers will suffer. *See LightSquared Comments* at 95-102. The 2 GHz Dish plan is one example. Note that the FCC took appropriate procedural steps to modify the allocation for 2 GHz in 2011 expressly to include terrestrial mobile and recently launched a comprehensive rulemaking and NOI to consider operations, licensing, service rules for these new operations. *See In the Matter of Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands; Fixed and*

the public interest would not be served if other critical national infrastructure – the GPS system – is simply sacrificed to LightSquared’s plan. GPS, which was first developed in 1978, opened to international use in 1983 at the order of President Reagan,³⁶ and visible in military use in 1991 during its successful application in Operation Desert Storm,³⁷ has become an essential application to many government and civilian sectors today.

Today, commercial applications of GPS technology generates substantial economic benefits in this country. Direct economic benefits on commercial GPS users are estimated to be \$67.6 billion per year in the United States alone.³⁸ Currently more than an estimated 3.3 million jobs rely on GPS technology, including roughly 130,000 in GPS manufacturing industries and an estimated 3.2 million in “downstream” commercial GPS-intensive industries.³⁹ Based on rapidly rising adoption rates, it is expected that GPS technology will generate up to \$122.4 billion annually in economic benefits affecting more than 5.8 million jobs in downstream industries.⁴⁰

Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz and 2483.5-2500 MHz and 2000-2020 MHz; Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands, Notice of Proposed Rulemaking and Notice of Inquiry, WT Docket No. 12-70, ET Docket No. 10-142, WT Docket No. 04-356 (rel. Mar. 21, 2012). Further, it is worth noting that LightSquared’s network, if deployed, will be the third, fourth, or fifth LTE network available to most consumers, whereas there is no second or third GPS system available if the one we have becomes unusable.

³⁶ Deputy Press Sec’y Speakes, Statement on the Soviet Attack on a Korean Civilian Airline, (Sept. 16, 1983) (“Speakes Statement”), <http://www.reagan.utexas.edu/archives/speeches/1983/91683c.htm>.

³⁷ *A Review of Issues Associated with Improving Our Nation’s Aviation Satellite-based Global Positioning System Infrastructure: Before the Subcomm. on Aviation, H. Transp. and Infrastructure Comm.*, 112th Cong. at 1 (Feb. 8, 2012) (testimony of Dr. Scott Pace, Director Space Policy Institute Elliott School of International Affairs, The George Washington University) (“Pace Testimony”). In the 1991 Gulf War, as an early example, GPS technology played an important role by allowing U.S. troops to navigate on land, sea, and in the air for targeting of bombs and for on-board missile guidance. See Nam D Pham, *The Economic Benefits of Commercial GPS Use in the U.S. and the Costs of Potential Disruption*, Report, 3 (June 22, 2011) (“Pham Report”), available at <http://www.saveourgps.org/pdf/GPS-Report-June-22-2011.pdf>.

³⁸ Pham Report at 10.

³⁹ *Id.* at 1.

⁴⁰ *Id.* at 10.

With an estimated National investment of roughly \$34 billion over more than two decades to field and operate the GPS constellation,⁴¹ GPS technology has transformed American military capabilities⁴² and has become an integral feature of US and coalition training and operations. Used throughout all the Services and Combatant Commands, GPS supports training and contingency operations, ranging from the tactical through strategic levels.”⁴³ “GPS is used by all our Services, from boots-on-the-ground patrols, to precision-guided munitions, to synchronization and security of communications networks, to search and rescue operations, to humanitarian relief operations.”⁴⁴ In specific applications, “GPS is designed to deliver extremely accurate information of 3-dimensional positioning and precise timing to DoD aircraft, ships, land vehicles, and personnel on the ground.”⁴⁵ President Obama has recognized the importance of GPS to National Security in the 21st century:

The full spectrum of U.S. military capabilities depends on our space systems. To maintain our technological edge and protect assets in this domain, we will continue to invest in next-generation capabilities such as operationally responsive space and global positioning systems.⁴⁶

⁴¹ *Sustaining GPS for National Security: Dep’t of the Air Force Presentation to the Subcomm. on Strategic Forces, H. Comm. on Armed Servs.*, 112th Cong. at 3 (Sept. 15, 2011) (statement of William L. Shelton, Commander, Air Force Space Command) (“Shelton HAS Testimony”).

⁴² The GPS is a dual use (military and civilian) constellation of more than 24 satellites managed by the U.S. Department of Defense as a national asset, Civilian access to GPS is provided on a continuous, worldwide basis free of direct user fees. See <http://www.gps.gov/policy>.

⁴³ *Sustaining GPS for National Security: Before the Subcomm. on Strategic Forces, H. Comm. on Armed Servs.*, 112th Cong. at 2 (Sept. 15, 2011) (statement of Teresa M. Takai, Dep’t of Defense Chief Information Officer) (“Takai HAS Testimony”). “GPS is vital to national security and is relied upon by our service men and women for a wide array of capabilities. . . . To provide but a few examples, GPS signals are used to ensure the accuracy of precision-guided munitions, to guide troop movements, to synchronize communications networks, to enable battle-space situational awareness, and to conduct search and rescue operations.” *Id.*

⁴⁴ Shelton HAS testimony at 1.

⁴⁵ Takai HAS Testimony at 2.

⁴⁶ The White House, Defense: Guiding Principles, <http://www.whitehouse.gov/issues/defense> (last visited Mar, 30, 2012).

In civilian applications, the wide availability of GPS technology has led to a multitude of GPS applications pervasive in virtually every aspect of modern American life today.⁴⁷ Consumer reliance on GPS - in cars, cellphones and personal navigators - is so pervasive in American daily life that GPS has fundamentally transformed the way we live.⁴⁸ Our public safety system and first responders rely heavily on GPS technologies for “wireless 911 location, support of dispatch operations, mapping/response directions to responders, and synchronization of simulcast communications systems across the country.”⁴⁹ First responders, including law enforcement, medical emergency, and firefighting crews depend on GPS for easy and accurate ground navigation allowing quick responses to time-urgent events.⁵⁰ GPS is also used by the Department of Homeland Security for National border and maritime security.⁵¹

Civil aviation is another critical application for GPS technology. GPS is a key element of the Next Generation Air Transportation System (“NEXTGEN”) that is expected to greatly enhance flight safety while increasing airspace capacity.⁵² NEXTGEN will be used to “shorten routes, save time and fuel, reduce traffic delays, increase capacity and permit controllers to

⁴⁷ The new innovations in GPS are expanding rapidly. “There are more GPS applications than we can count, and at the NCO [National Coordination Committee] we learn of new applications at the rate of about three per week.” *Impacts of the LightSquared Network on Federal Science Activities: H. Comm. on Science, Space, and Technology*, 112th Cong. at 4 (testimony of Anthony J. Russo, Director, National Coordination Office, Space-Based Positioning, Navigation and Timing) (“Russo SST Testimony”). See also Public Safety and Disaster Relief Applications, <http://www.gps.gov/applications/safety> (last visited Mar. 30, 2012).

⁴⁸ See Sen. Ben Nelson (R-NE), *How Did We Ever Get Along Before GPS?* (Feb. 21, 2012), http://bennelson.senate.gov/press/press_releases/how-did-we-ever-get-along-before-gps.cfm.

⁴⁹ Comments of National Public Safety Telecommunications Council, IB Docket No. 11-109, 4 (filed Feb. 27, 2012).

⁵⁰ Takai HAS Testimony at 2.

⁵¹ *Id.*

⁵² See *A Review of Issues Associated with Protecting and Improving Our Nation’s Aviation Satellite-Based Global Positioning System Infrastructure: Before the Subcomm. on Aviation, H. Comm. on Transportation and Infrastructure*, 112th Cong. at 1 (Feb. 8, 2012) (statement of Hon. John. D. Porcari, Deputy Secretary, U.S. Dep’t of Transportation).

monitor and manage aircraft with greater safety margins.”⁵³ Our Nation’s train system is also reliant on GPS technology. For Positive Train control, GPS is the preferred method of preventing train-to-train collisions, train derailments, and accidents caused by railroad switches left in an incorrect position.⁵⁴ “Major communications networks, banking systems, financial markets and power grids depend heavily on GPS for precise time synchronization.”⁵⁵

In agriculture, Deere believes that the expanded use of GPS is the most significant single technological advancement for American farm equipment in the past 15 years.⁵⁶ High precision GPS technology, which is quickly becoming the standard for modern farming practices, allows equipment operators to pinpoint their location to within 2-10 centimeters,⁵⁷ enabling growers unprecedented ability to manage land, water, seed, fertilizer, pesticides and labor resources to significantly minimize costs and waste, greatly increase efficiency and crop yield, and responsibly manage important environmental concerns.⁵⁸ GPS technology also allows farmers to work

⁵³ *Impacts of the LightSquared Network on Federal Science Activities: Before the H. Comm. on Science, Space and Technology*, 112th Cong. at 1 (Sept. 8, 2011) (statement of Hon. Peter H. Appel, Administrator, Research and Innovative Technology Administration, U.S. Dep’t of Transp.) (“Appel SST Testimony”).

⁵⁴ Russo SST Testimony at 1, 3.

⁵⁵ Russo SST Testimony at 1.

⁵⁶ *See, e.g.*, Comments of Illinois Farm Bureau, IB Docket No. 11-109 at 1 (filed Mar. 16, 2012) (“GPS applications in agriculture have yielded revolutionary benefits . . .”).

⁵⁷ GPS-based applications in precision farming are being used for farm planning, field mapping, soil sampling, tractor guidance, crop scouting, variable rate applications, and yield mapping. *See* <http://www.gps.gov/applications/agriculture>. High precision agriculture employs GPS receivers and receive-only mobile earth stations that downlink augmentation signals from L-band satellites covering the United States and the entire world. These satellites provide correctional data that greatly enhances the accuracy of the GPS measurements.

⁵⁸ Deere and other companies in the U.S. agricultural and construction sectors alone have already invested billions of dollars to deploy high precision GPS technologies. Between 2007 and 2010, not including other direct and indirect benefits, it is estimated that GPS technology accounted for an aggregate annual benefit of \$19.9 billion per year, the equivalent of 11.8 percent of the total annual production in this sector. *See* Pham Report at 7.

during low visibility field conditions such as in rain, dust, fog, and darkness.⁵⁹ In the words of a group of major agriculture interests:

The benefits of high precision GPS to U.S. agriculture are immense and diverse. By enabling farmers to make precise applications for planting, irrigation, and crop protection, GPS technology has been responsible for remarkable growth in productivity, farm income, and improved environmental sustainability.⁶⁰

Deere estimates that the degradation or disruption of high precision GPS signals could result in a negative impact to U.S. farmers of \$14 billion to \$30 billion *annually*.⁶¹

In the construction context, GPS technology has also led to substantial increases in productivity (by as much as 50 percent)⁶² and safety by enabling machine control and guidance systems that allow operators to grade sites with increased accuracy without the need for survey stakes.⁶³ Earthmoving systems, fleet management systems and proximity and detection systems, among other construction equipment rely on GPS technology for worker safety and to avoid

⁵⁹ See <http://www.gps.gov/applications/agriculture>; see also Comments of the California Farm Bureau, IB Docket No. 11-109 at 1 (filed Feb. 28, 2012).

⁶⁰ Joint Comments of American Farm Bureau Federation, American Soybean Association, American Sugar Cane League, Association of Equipment Manufacturers, National Association of Wheat Growers, National Barley Growers Association, National Corn Growers Association, National Council of Farmer Cooperatives, National Potato Council, National Sunflower Association, US Canola Association, USA Dry Pea & Lentil Council, and USA Rice Federation, IB Docket No. 11-109, at 1 (filed Mar. 14, 2012).

⁶¹ This estimate, based on Deere's evaluation of field results and university studies, assumes GPS enables at a minimum \$8 billion of savings annually in terms of fuel, seed and fertilizer, and at least \$6 billion annually in improved yield. Based on these calculations, the *annual* loss to the agricultural community alone were GPS services to be disrupted would exceed LightSquared's entire estimated \$14 billion network build.

⁶² See Comments of Caterpillar Inc., IB Docket No. 11-109, at 1 (filed July 29, 2011). See also Comments on TWG of the Association of Equipment Manufacturers, IB Docket No. 11-109, at 2 (filed Aug. 1, 2011) ("AEM Comments"). According to leading construction equipment manufacturer Caterpillar, Inc., for the past 14 years, it has incorporated GPS technology in its construction and mining equipment and today virtually all Caterpillar equipment is sold with precision GPS equipment.

⁶³ See AEM Comments.

costly delays to infrastructure and other construction projects.⁶⁴ Similarly, GPS technology is extensively used in high precision equipment for survey, mapping, and in geographic information systems (“GIS”) applications. Today, high precision GPS receivers are essential for geodetic control for highway projects, including roads, bridges and to establish vertical control in remote areas for flood plain determinations, among other things.⁶⁵ In the heavy and civil engineering construction industry, GPS technology is estimated to produce \$ 9.2 billion in annual cost savings.⁶⁶

The record also reflects that GPS is essential to various important scientific research and monitoring projects. By way of example, GPS technology is a key enabler for all operations systems and functions at the National Oceanic and Atmospheric Administration (“NOAA”) affecting weather forecasting, climate observation, search and rescue, marine navigation, and emergency response.⁶⁷ The National Aeronautics and Space Administration (“NASA”) uses GPS technology for ground-based, airborne and space-based receivers used to support earth science research, disaster monitoring, ground-truth calibration of instruments in orbit, precision navigation of aircraft and spacecraft and search and rescue efforts.⁶⁸ According to UNAVCO,⁶⁹ its

⁶⁴ *Id.* at 3.

⁶⁵ *See* Comments of Shyka, Sheppard, & Garster, IB Docket No. 11-109, at 1 (filed Aug. 1, 2011). *See also* AASHTO Comments, IB Docket No. 11-109, at 1, 2 (filed Aug. 1, 2011) (Precision GPS is used for “measurements in preparation of surfaces for buildings, roadways, rail and runways.”).

⁶⁶ Based on 2007 estimated 40% adoption rate. Pham Report at 10. At predicted adoption rates, total annual benefits are expected to rise to \$ 23 billion, the equivalent of 9.4% of the annual value of the industry. *Id.*

⁶⁷ *Hearing on the LightSquared Interference to the Global Positioning System: Before the H. Comm. on Science, Space, and Technology*, 112th Cong. at 2 (Sept. 8, 2011) (testimony of Mary M. Glackin, Deputy Undersecretary for Operations, National Oceanic and Atmospheric Administration).

⁶⁸ *Hearing on the LightSquared Interference to the Global Positioning System: Before the H. Comm. on Science, Space, and Technology*, 112th Cong. at 1 (Sept. 8, 2011) (statement of Victor D. Sparrow, Director, Spectrum Policy and Planning Division, Human Exploration and Operation Missions Directorate, National Aeronautics and Space Administration).

members depend on high precision GPS for important earth science and atmospheric research. UNAVCO supports approximately 2000 high precision GPS monitoring stations in the U.S. “including the 1100-station Plate Boundary Observatory, the geodetic component of the NSF’s EarthScope Project in which \$ 100 million was invested.”⁷⁰

B. GPS is a Critical National Resource that the Country is Committed to Protect

The Commission’s proposed actions align with the U.S. government’s long-held view that GPS technology has the significant potential to lead advances in a broad range of innovative military and civilian applications delivering unprecedented public benefit. To help realize that potential, for more than two decades, U.S. government policy has increasingly encouraged use of GPS technology and sought to protect it from harm due to changes in technical, political, or financial policies. Examples include President Reagan’s 1983 directive following the Soviet action to shoot down a civilian Korean airliner that had accidentally strayed into Soviet airspace declaring that the U.S. Global Positioning System would henceforth be available to civilian aircraft to improve air navigation and potentially avoid such incidents in the future.⁷¹ In May, 2000 President Clinton announced that GPS technology would no longer be subject to “Selective Availability,” a government policy that intentionally degraded public GPS signals for national

⁶⁹ Comments of UNAVCO, IB Docket No. 11-109, at 1 (filed Aug. 1, 2011). UNAVCO is a consortium of over 90 U.S. universities and 65 organizations, funded by the National Science Foundation (“NSF”) and NASA to support and advance the geodesy community’s science goals.

⁷⁰ *Id.* at 1. UNAVCO estimates that its projects to date represent a taxpayer investment of \$ 190,000,000 since 2003. *Id.* See also Comments of University of Texas at Arlington, IB Docket No. 11-109 (filed July 31, 2011) University of Texas at Arlington team relies on GPS to measure “active deformation in Puerto Rico, the Dominican Republic Haiti and the U.S., and British Virgin Islands” and other countries to define seismic hazards in the northeastern Caribbean and Central America) *see also* Comments of University Corporation for Atmospheric Research, IB Docket No. 11-109 (filed Aug. 1, 2011).

⁷¹ See Speakes Statement.

security reasons.⁷² This decision was intended to make GPS more responsive to civil and commercial users worldwide⁷³ with the expectation that the improvement in available accuracy would accelerate its acceptance and use by businesses, governments, and private individuals around the globe leading to "increases in productivity, efficiency, safety, scientific knowledge, and quality of life."⁷⁴

President Obama in 2010 issued a National Space Policy which, among other things, reaffirmed and expanded our commitment to GPS as a national priority.⁷⁵ That policy directs all departments and agencies to "Maintain and Enhance Space-based Positioning, Navigation, and Timing Systems. The United States must maintain its leadership in the service, provision, and use of global navigation satellite system (GNSS)."⁷⁶ To this end, the President's policy outlines multiple priorities including "Operate and maintain the GPS constellation to satisfy civil and national security needs ... Foreign positioning, navigation and timing (PNT) services may be used to augment⁷⁷ and strengthen the resiliency of GPS." Further, departments and agencies are directed to "invest in domestic capabilities and support international activities to detect, mitigate,

⁷² Former President Bill Clinton, Statement by the President Regarding the United States Decision to Stop Degrading Global Positioning System Accuracy (May 1, 2000) ("Originally developed by the Department of Defense as a military system, GPS has become a global utility . . . This increase in accuracy will allow new GPS applications to emerge and continue to enhance the lives of people around the world."), available at http://clinton3.nara.gov/WH/EOP/OSTP/html/0053_2.html.

⁷³ *Id.*

⁷⁴ As SA was discontinued, an immediate improvement in accuracy error was detected. "As illustration consider a football stadium. With SA activated, you really only know if you are on the field or in the stands at that football stadium; with SA switched off, you know which yard marker you are standing on." *Data From the First Week Without Selective Availability*, Gps.gov., <http://www.gps.gov/systems/gps/modernization/sa/data/> (last visited Mar. 30, 2012).

⁷⁵ National Space Policy of the United States of America, at 5 (June 28, 2010), available at http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf. ("National Space Policy").

⁷⁶ *Id.* at 5.

⁷⁷ *Id.* at 5.

and increase resiliency to harmful interference to GPS”⁷⁸ The President’s policy clearly places a priority on interference protection for GPS.⁷⁹ It is entirely appropriate and in fact necessary for the Commission to weigh this important national policy in its spectrum management decisions. While expanding access to wireless broadband services is also a Commission priority which the President shares,⁸⁰ it should not (and need not) be accomplished in a manner that causes harm to GPS.

V. THE FCC’S PROPOSED ACTIONS MODIFYING/RESCINDING LIGHT-SQUARED’S ATC AUTHORITY/CONDITIONAL WAIVER ARE FULLY SUPPORTED BY A RECORD REplete WITH EXTENSIVE, OPEN, FAIR TECHNICAL TESTING AND ANALYSIS

The technical record developed over the last year evidences a herculean test effort involving a high degree of coordination and cooperation among LightSquared, U.S. government interests, GPS manufacturers and commercial GPS users. The data yielded from this massive undertaking supports only one conclusion – all variants of LightSquared’s proposed terrestrial L-

⁷⁸ The U.S. has worked to strengthen its relationship with other countries in connection with our mutual interest in the interference free use of satellite navigation and timing signals. For example, the U.S. and the EU in 2004 agreed, among other things, “to ensure radio frequency compatibility in spectrum use between each other’s signals, *to make all practicable efforts to protect each other’s signals from interference.*” Agreement on the Promotion, Provision and Use of Galileo and GPS Satellite-Based Navigation Systems and Related Applications, at 16 (June 26, 2004) (emphasis added), *available at* <http://www.pnt.gov/public/docs/2004/gpsgalileoagreement.pdf>. The U.S. has also agreed to work in joint cooperation with other countries, including Australia, China, Europe, India, Japan and Russia, to coordinate use of GPS. *See* International Cooperation, National Executive Committee website, *available at* <http://www.pnt.gov/international/> (describing the committee’s international GPS cooperation efforts with specific counties and international organizations); *see also* Maureen Walker (U.S. Department of State, National Space Based PNT Coordination Office), Presentation to the U.S. States and Local Government Subcomm.: *U.S. GPS Policy and U.S. International Cooperation Activities*, *available at* <http://www.pnt.gov/public/2011/04/CGSIC/walker1.pdf> (describing bilateral cooperation efforts with foreign countries stating that “international cooperation is a priority” and “compatibility and interoperability [are] very important”).

⁷⁹ *See* National Space Policy.

⁸⁰ *See* The White House, Office of the Press Secretary, *Presidential Memorandum: Unleashing the Wireless Broadband Revolution* (June 28, 2010), <http://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution>.

band network create unacceptable and immitigable interference for GPS receivers and GPS-based applications. As Deere and other commenters have highlighted throughout the record, empirical testing and modeling confirms that LightSquared's proposed network would create devastating interference for many GPS systems, including safety-of-life applications and devices embedded in critical U.S. infrastructure.

- LightSquared's original network proposal created indisputable levels of harmful interference for all classes of GPS receiver, even when base station output was dramatically reduced to levels previously approved by the Commission in 2005.⁸¹
- High Precision receivers used for agriculture, construction, national defense and homeland security applications experienced severe interference at ranges exceeding 20 kilometers.⁸²
- 75% of Personal/General Navigation receivers, devices used for safety-of-life and many other applications, experienced harmful interference even when exposed to LightSquared's revised "Low 10 MHz" base station signal.⁸³
- Aviation receivers, including Terrain Awareness and Warning Systems ("TAWS"), would experience interference in the presence of a "Low 10 MHz" signal that could affect flight safety.⁸⁴
- Space Based receivers would experience harmful interference at distances of up to 800 kilometers.⁸⁵

⁸¹ See Working Group Final Report, SAT-MOD-20101118-00239, at 27 (Aviation), 55 (Cellular), 122 (Personal/General Navigation) and 180-182 (re High Precision, Timing and Networks) (dated June 30, 2011) ("*TWG Final Report*"); see also Letter from Lawrence E. Strickling, Assistant Secretary for Communications and Information, U.S. Dept. of Commerce, to William Lynn, Deputy Secretary, U.S. Department of Defense and John Porcari, Deputy Secretary, U.S. Department of Transportation, at 2 (dated Sep. 13. 2011) ("*NTIA Tasking Letter*").

⁸² See *TWG Final Repor*, at 181.

⁸³ See NPEF Study, Follow-on Assessment of LightSquared Ancillary Terrestrial Component Effects on GPS Receivers, § 5.1.1.2, at 32 (Public Version, released January 18, 2012) ("*NPEF January 2012 Study*").

⁸⁴ See U.S. Department of Transportation, FAA, "Status Report: Assessment of Compatibility of Planned LightSquared Ancillary Terrestrial Component Transmissions in the 1526-1536 MHz Band with Certified Aviation GPS Receivers," Exec. Summary, at ii ("*FAA Report*").

⁸⁵ See *TWG Final Report* at 300.

- Out-of-band emissions (“OOBE”) from LightSquared handsets operating in the 1627.5-1637.5 MHz band created harmful interference for many GPS receivers under test at signal strength levels that would be encountered in real-world environments if LightSquared were allowed to deploy its terrestrial-only network.⁸⁶

The test efforts confirming the immitigable interference threat LightSquared’s proposed network presents to GPS receivers and GPS-based applications were comprehensive, impartial, and enthusiastically supported by LightSquared. Challenges to the methodology and execution of the tests and modeling have been raised by LightSquared largely after the release of damning data that supports the NTIA’s recommendations and the proposed course of action set forth by the Commission in the *Public Notice*. These challenges are both transparent and meritless. If LightSquared had serious concerns regarding test methodology or execution, it had many months to address them during the development of TWG and NPEF test plans and early stages of testing. It elected not to raise concerns earlier because the methodology and execution were sound.

A. NPEF Testing Was Impartial and Subject to Painstaking Peer Review

While LightSquared’s Comments complain that government-led testing was biased, NPEF test methodologies and execution remain beyond reproach.⁸⁷ The NPEF test effort was

⁸⁶ See NPEF *January 2012 Study*, Section 5.1.2.3 at pg. 34; See also, *Exhibit 1 – Noise Floor Degradation Due to OOBE* (providing further technical background regarding OOBE interference created by handsets operating in the 1626.5-1660.5 MHz when operated individually or in aggregate near a GPS receiver).

⁸⁷ See, e.g., *LightSquared Comments* at 88. This is by no means the first time that LightSquared has raised specious allegations in an improper effort to punish and intimidate a participant in the regulatory process for raising technical and policy objections to its proposed terrestrial network. Indeed, in the hopes of disrupting Deere's operations and for the express purpose of removing Deere as a policy opponent in this proceeding, LightSquared sought the revocation of Deere's Part 25 satellite earth terminal license because “[i]n recent months, Deere has made numerous public statements asserting that the Commission should curtail deployment of LightSquared's terrestrial broadband network in the L Band in order to preserve Deere's ability to manufacture, market and operate receivers . . .” Application of Deere & Company for Renewal of Earth Station License, IBFS File No. SES-RWL-20110908-01047, Petition for Reconsideration of LightSquared, Inc. (filed Oct. 14, 2011) at 10. There, in a desperate attempt to silence objections in this proceeding to the interference that LightSquared's network will cause to GPS, LightSquared filed a "strike" Petition (for Reconsideration) and Reply that put forth outrageous and untruthful allegations against Deere. For example, LightSquared alleged in its Petition that Deere overlooked filing

subject to rigorous peer review by the Idaho National Laboratory (“INL”) and the Massachusetts Institute of Technology Lincoln Laboratory (“Lincoln Lab”), both of which determined that the tests accomplished the goal established in the NTIA’s tasking letter – expeditiously developing and executing a test plan, in cooperation with LightSquared, to evaluate the impact of a “Low 10 MHz” base station emission on Personal/General Navigation and certain other classes of GPS receiver.⁸⁸

The INL, a national laboratory in operation since 1949 dedicated to supporting the U.S. government missions in nuclear and energy research, science, and national defense,⁸⁹ was tasked with “review[ing] the testing requirements established in the NPEF Tasking Statement and compare[ing] them to the test plan,” and “[r]eviewing the test set-up and observ[ing] the test execution and data collection.”⁹⁰ Moreover, the INL was instructed to “ensure that the test plan and test execution accomplish the objectives and meet the requirements established by the tasking letters.”⁹¹ The INL team tasked with evaluating the NPEF test effort found no “discrepancies to report,” and determined that the “[t]esting was conducted as planned.”⁹²

a ministerial Certificate of Completion informing the Commission that its StarFire network of mobile earth stations was operational, when, in fact, LightSquared simply failed to exercise due diligence in reviewing the Satellite Division’s records. When Deere corrected LightSquared’s error in its Opposition (at page 9), and provided a copy of the filing obtained from the FCC, LightSquared – again, without any basis to support its claim – suggested in its Reply (at page 9) that Deere (or counsel) could have “simply inserted” such a letter in the FCC file “years after the fact” or that the copy of the letter may be a fraud. This behavior illustrates a continuing pattern of abuse of Commission procedures and raises questions whether LightSquared has disregarded the principles of Section 1.17 of the Commission’s Rules that requires truthful and accurate statements to the Commission. 47 C.F.R 1.17.

⁸⁸ See *NPEF January 2012 Study*, § 1.3, at 3.

⁸⁹ Idaho National Laboratory Homepage, <https://inlportal.inl.gov/portal/server.pt/community/about> (last visited Mar. 29, 2012).

⁹⁰ *NPEF January 2012 Study*, § 1.3, at 3.

⁹¹ *Id.*

⁹² *Id.*

The Lincoln Lab is a federally funded research and development center sponsored by the Department of Defense providing assistance with “scientific research and analysis, systems development, and systems acquisition to provide novel, cost-effective solutions to complex government problems.”⁹³ To ensure “objectivity and technical excellence,” the Lincoln Lab is organized as an “independent, not-for-profit entity, prohibited from manufacturing products, competing with industry, or working for commercial companies.”⁹⁴ The Lincoln Lab strives to provide independent perspective on critical issues, maintain long-term competency, retain high-quality staff, sustain strategic sponsor relationships, and develop technology for both long-term interests and short-term, high-priority needs. With regard to the instant evaluation of LightSquared’s potential interference impact on GPS receivers and GPS-based applications, the Lincoln Lab was tasked “to perform an independent peer-review and engineering assessment of the NPEF testing methods and finds,” and at the conclusion of this review confirmed that test “findings support [the] conclusion that Lower 10 MHz LightSquared signal results in harmful interference to [a] majority of GPS devices tested.”⁹⁵

Even if the NPEF test effort had not been subject to the rigorous and redundant peer review described above, LightSquared’s own involvement in the NPEF tests discredits assertions by the company that the test methodology and/or test execution were not impartial and undertaken in good faith. NTIA gave the NPEF team explicit instructions to coordinate and include LightSquared in its test effort.⁹⁶ The NPEF followed these instructions to the letter, involving

⁹³ Massachusetts Institute of Technology Lincoln Laboratory Homepage <http://www.ll.mit.edu/about/ffrdcs.html> (last visited Mar. 29, 2012).

⁹⁴ *Id.*

⁹⁵ *MIT Lincoln Labs Independent Review of LightSquared Ancillary Terrestrial Component Effect on GPS Signals* (Jan. 6, 2012) (Note: document available For Official Use Only).

⁹⁶ *NTIA Tasking Letter* at 1.

LightSquared heavily in test planning, and encouraging LightSquared to provide the necessary equipment used to simulate a “Low 10 MHz” base station signal during conducted tests at Space and Naval Warfare Systems Command laboratories in San Diego, California, and radiated, anechoic chamber tests at the Army Electromagnetic Vulnerability Assessment Facility at the White Sands Missile Range in New Mexico.⁹⁷ Test planning began in September 2011 and continued through October of 2011. If LightSquared had meaningful concerns regarding the NPEF’s test methodology, it had every incentive and opportunity to raise them during this planning period. LightSquared’s assertions regarding test methodology and bias, however, were only leveled after testing was underway in November, the point at which the company, through its direct involvement in the testing, became aware that NPEF test data was negative and confirmed the full extent of interference created to GPS by even a “Low 10 MHz” network configuration.⁹⁸

B. LightSquared Co-Chaired TWG Tests Reinforce the NPEF Conclusion That the Proposed Terrestrial Use of the L-Band Severely Harms GPS

Much of the most damaging data in the extensive technical recording in this proceeding was in fact generated during the TWG test effort, which LightSquared co-chaired and organized. It was the TWG test effort that determined LightSquared’s original network configuration was incompatible with all classes of GPS receiver, and prompted LightSquared to propose its “Low 10 MHz” network configuration, as well as several other mitigation schemes that have proven to

⁹⁷ See, e.g., *NPEF January 2012 Study*, § 3.2.2.1, at 7.

⁹⁸ On October 31, 2011, LightSquared filed an ex parte letter reasserting its confidence in government testing. See Ex Parte Letter to Marlene Dortch, Secretary, Federal Communications Commission from Jeffrey Carlisle, EVP, LightSquared, IBFS File No. SAT-MOD-20101118-00239, at 3 (filed Oct. 31, 2011). On November 17, 2011, LightSquared filed an ex parte letter arguing that government tests already underway were “subjective.” See Ex Parte Letter to Marlene Dortch, Secretary, Federal Communications Commission from Henry Goldberg, Outside Counsel, LightSquared, IBFS File No. SAT-MOD-20101118-00239, at 2 (filed Nov. 17, 2011).

be ineffective or infeasible to implement in a real-world network.⁹⁹ It was also the TWG test effort that initially confirmed LightSquared handsets operating in the 1626.5-1660.5 MHz band would create significant harmful interference to GPS receivers, even if such handsets were deployed with a spectral mask that satisfied OOB obligations agreed to by LightSquared.¹⁰⁰

To the extent that NPEF and TWG programs overlap, the test results developed by the two are consistent, and in particular demonstrate the harmful interference threat presented by a “Low 10 MHz” signal to Personal/General Navigation receivers. Specifically, the LightSquared co-chaired TWG test effort found that 20 of 29 (approx. 69%) Personal/General Navigation receivers under test experienced harmful interference when exposed to a “Low 10 MHz” signal.¹⁰¹ The NPEF test effort found that 69 of 92 (approx. 75%) Personal/General Navigation receivers under test experienced harmful interference when exposed to a “Low 10 MHz” signal.¹⁰² The consistency in the test results between the two test programs does ***not*** support assertions of bias by the NPEF test effort. To the contrary, this consistency in the test data evidences that LightSquared’s proposed “Low 10 MHz” signal presents a meaningful threat of harmful interference to Personal/General Navigation receivers were LightSquared authorized to operate terrestrial base stations.

C. LightSquared’s Concerns Regarding Specific Test Parameters Have Been Fully Addressed and Dismissed

In an effort to cast doubt on the NPEF test effort, LightSquared’s comments identify a wide range of individual test parameters and metrics that it asserts are in some way flawed or deficient. The majority of LightSquared’s grousing and criticism involves test parame-

⁹⁹ See, e.g., *TWG Final Report* at 27, 55, 122 and 180-182.

¹⁰⁰ See, e.g., *TWG Final Report* at 310.

¹⁰¹ See *TWG Final Report* at 177.

¹⁰² See *NPEF January 2012 Study*, § 5.2, at 7.

ters/metrics that are inconsequential to the outcome of interference testing.¹⁰³ With regard to these criticisms, even if the NPEF revised the affected parameter/metric, the ultimate outcome of the interference tests would have remained the same – LightSquared’s “Low 10 MHz” base station signal would have still created massive levels of harmful interference. LightSquared also attacks certain core test parameters/metrics/assumptions that were central to the interference testing and cannot be modified or otherwise revised without compromising the scientific integrity of the tests. These criticisms have been raised before, considered and rejected by a consensus group of TWG participants and the NPEF. To ensure that the technical record is complete, Deere addresses these parameters/metrics/assumptions again.

1. One (1) dB of Loss in Signal-To-Noise Ratio Represents a Meaningful Degradation of Signals From GPS Satellites and Remains the Only Appropriate Interference Threshold

LightSquared’s Comments continue to lament the unanimous decision of the TWG, NPEF and FAA test efforts to adopt one (1) dB of loss in clean signal-to-noise ratio (“C/N₀”) for a GPS receiver in the presence of LightSquared base station signals as the definition of harmful interference. Despite LightSquared’s assertions, the Commission has never “rejected” 1 dB loss of C/N₀ as an appropriate interference threshold for GPS receivers.¹⁰⁴ 1 dB loss of C/N₀ has been

¹⁰³ For example, LightSquared complains that the adoption of Left Hand Circular Polarization (“LHCP”) for base station transmissions should have reduced the margin of interference by several dB. See *LightSquared Comments*, App’x, A-35 to A-37. This assertion is *not* scientifically sound. The use of LHCP might create isolation and a corresponding reduction in the margin of interference at the boresight of the transmitting antenna; however, the difference in polarity between the interfering transmitter and affected receiver decreases dramatically as the incidence angle decreases, therefore negating the isolation/reduction in interference margin. Moreover, in urban canyons with significant reflection and refraction, signals rapidly lose their polarization and any interference reduction offered by LHCP would be largely negated. In any event, the use of LHCP does not offer a consistent 6 dB reduction in interference margin as suggested by LightSquared.

¹⁰⁴ Language cited by LightSquared from the Commission’s 2003 UWB Order distorts a narrow discussion regarding the interference potential of very low powered surveillance equipment using directional antennas that are operated for brief periods of time. The Commission acknowledged that such operation could in fact present an interference threat to GPS and other radio services, and placed extraordinary

established as an appropriate real-world interference threshold for low-powered space-to-earth applications by the Commission, and the NTIA, FAA and DOD concur that it should apply in the instant situation to sensitive GPS receivers that navigate commercial aircraft and guide first responders, among the many other critical applications made possible by GPS-based technology.¹⁰⁵

LightSquared nonetheless reasserts that “a small change in C/N_0 is of no more than minimal significance.”¹⁰⁶ The obvious flaw in LightSquared’s argument is that 1 dB of loss in C/N_0 represents a full 25% loss of clean signal, hardly a “small change.” As Deere and other commenters have pointed out on numerous occasions during the last year, 1 dB of loss in C/N_0 can result in the loss of satellite lock and complete failure of a GPS receiver, in particular in real-world environments in which signals from the overhead satellites may be severely degraded such as when a Personal/General Navigation device is moving through an urban canyon or when a High Precision device mounted on agricultural equipment is moving under a dense tree canopy.¹⁰⁷

Degradation greater than 1 dB is also not acceptable because the weak signals in the GNSS bands are under assault from various sources, including multiple LTE base stations, LTE

limitations on its operation, including strictly prohibiting the proliferation of such equipment beyond fire, police and rescue personnel. *See Revision of Part 15 of the Commission’s Rules Regarding Ultra-Wideband Transmission Systems*, 18 FCC Rcd 3857, at ¶¶ 11-17 (2003).

¹⁰⁵ *See, e.g., Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, IB Docket No. 95-91, 50 CR 650, at ¶ 99 (2010); *see also Amendment of Part 27 of the Commission’s Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band*, Report and Order, 25 FCC Rcd 11710, ¶¶ 89-115 (2010).

¹⁰⁶ *LightSquared Comments* at 80.

¹⁰⁷ *See, e.g., Comments of Deere & Company*, IB Docket No 11-109, at 19-20 (filed Aug. 1, 2011) (“*Deere 11-109 Comments*”); *see also Comments of Trimble Navigation Limited*, IB Docket No 11-109 at 49 (filed August 1, 2011) (“*Trimble 11-109 Comments*”).

handsets and other cumulative sources of degradation.¹⁰⁸ The worst impact is in challenging satellite reception situations, such as when the satellite constellation geometry is poor and/or there is vegetation attenuating signals from large sections of the sky. GPS receiver designers go to considerable lengths to minimize the receiver noise contribution to the error budget. Only by keeping every degradation source below the harmful threshold can robust GPS operation be reasonably expected. In both aforementioned instances, a 1 dB loss of C/N_0 may completely disrupt navigational functions. Further, since the LightSquared terrestrial base stations interfere with GPS reception by overloading the receiver, the extent of the C/N_0 degradation cannot be determined by simply summing the powers of the various interference sources in the GPS band. The overload process is not linear, and the effects of multiple interference sources on C/N_0 cannot be assumed to be additive. Adding a small additional noise source may produce effects in the receiver that are not proportional to the added noise, and larger than would be expected in a linear system.

2. Government Tests Used Appropriate Propagation Models

LightSquared's Comments restate its complaint that a more aggressive propagation model such as Walfisch Ikegami Line of Sight ("WILOS") which is "typically used for the design of wireless networks" would have been preferable relative to the "free space" model employed by both NPEF and FAA.¹⁰⁹ WILOS may be an appropriate propagation model for the design and evaluation of a "typical" cellular network where the principal concern is appropriately spacing cellular infrastructure so as to avoid creating self-interference and ensuring maxi-

¹⁰⁸ It is noteworthy that the intensity of solar activity in the past two years has increased to a point where at times the ionosphere is so turbulent that the guaranteed minimum GPS receive levels in IS-GPS-200C are not met. This is not an environment in which further degradation in GPS signal quality is acceptable.

¹⁰⁹ *LightSquared Comments* at 79.

imum reuse of frequencies. As Deere and other commenters have repeatedly stressed, however, LightSquared’s proposed network is anything but “typical.”¹¹⁰ In frequencies that are allocated for terrestrial mobile use, and where cellular infrastructure is already deployed (e.g., 850 MHz band), signals that propagate further than anticipated do not jam important national infrastructure, flight-safety systems and navigation equipment used by emergency first responders. Moreover, there are known real-world environments where LightSquared’s proposed signal would propagate further than a free space model, let alone expected propagation calculated under a WILOS model. TWG tests confirmed that this concern is not merely theoretical. There were specific measurements recorded in Las Vegas during “live sky” tests where LightSquared’s simulated signal exceeded anticipated levels calculated using a free space model, at significant ranges many kilometers from the transmitting antenna.¹¹¹

D. LightSquared Wrongly Criticizes NPEF’s Conclusion That Near Term Mitigation Solutions are Unlikely

LightSquared wrongly asserts that the NTIA, acting on recommendations made by the NPEF and FAA, concluded in “error” that proposed interference mitigation solutions would not alleviate the harmful interference created by operating cellular base stations in the mobile satellite L-band.¹¹² In truth, the government spent significant time and energy evaluating interference mitigation solutions that were half baked and quickly discredited.

¹¹⁰ See, e.g., *Deere 11-109 Comments* at 20; (noting the role of GPS in next generation commercial aviation navigation); see also *Trimble 11-109 Comments* at 30-31 (explaining the impact of harmful interference to GPS on flight-safety, first responders and space-based receivers hundreds of miles above in orbit).

¹¹¹ See *TWG Final Report* at 260 (“Power data measured by Trimble, John Deere and LightSquared at the rural site in Las Vegas all show that the propagation model is very close to a free space model. In fact, due to multipath, the received power is often greater than a Live Sky model would predict”).

¹¹² See, e.g., *LightSquared Comments* at 17-18.

1. The NTIA Correctly Deemed LightSquared's Power-on-the-Ground Solution Impractical and Unimplementable

LightSquared incorrectly asserts that NTIA “fails to even mention [its -30 dBm] compromise proposal, let alone justify its rejection” of the proposal.¹¹³ LightSquared’s assertion is factually inaccurate; the NTIA did evaluate its proposal, but determined that to limit base station power-on-the-ground to -30 dBm “would require constant, individualized monitoring and adjustment of over 40,000 sites nationwide to ensure consistency . . . , [which] is not a practical solution, particularly where safety of life is involved.”¹¹⁴ The NTIA and FAA were actually generous in dedicating any resources to evaluate the -30 dBm proposal. The plan to limit power-on-the-ground was first mentioned in LightSquared’s June 30, 2011 comments regarding the *TWG Final Report*, along with other conceptual mitigation solutions, such as the implementation of a geolocation database.¹¹⁵ After raising these mitigation solutions in concept in June of 2011, LightSquared took no further action – no additional technical information or specific proposals were introduced into the record to demonstrate the viability of its power-on-the-ground or geolocation database schemes.

Major issues with respect to the power on the ground concept have never been adequately addressed. As an initial matter, any meaningful testing or simulation must be performed against the ultimate system configuration, including the ultimate proposed power on the ground, otherwise the entire process will need to be revised again as the configuration changes. Further, the measurement metric must guarantee specified power is not exceeded in all locations rather than

¹¹³ *LightSquared Comments* at 79.

¹¹⁴ See Letter from Lawrence E. Strickling, Assistant Secretary for Communications and Information, U.S. Dep’t of Commerce, to Julius Genachowski, Chairman, FCC at 5-6 (dated Feb. 14. 2012) (“*NTIA Letter*”).

¹¹⁵ See Recommendation of LightSquared Subsidiary LLC, SAT-MOD-20101118-000239, at 31-35 (filed June 30, 2011) (“*LightSquared Recommendations*”).

on a statistical basis.¹¹⁶ High precision GPS systems must work continuously as the farm is tilled or the road is graded, not statistically “most” of the time depending on the current spatial interference level. Emergency services must have positioning capability all the time in all locations in their service area, not merely some of the time in some locations. LightSquared’s “proposal” does not commit to a “not to exceed” power level or a means to ensure that a proposed power level is not exceeded anywhere within the network. Additionally, the LightSquared proposal does not provide a verifiable process by which LightSquared will discover and correct in a timely manner any deviation from the power limit.

Given the absence of substantive information and or efforts from LightSquared to develop its power-on-the-ground mitigation solution into a specific, workable proposal, and the need to literally implement the solution on a site-by-site basis, it is unclear exactly what LightSquared expected the NTIA to evaluate. Nevertheless, in an effort to accommodate LightSquared, the NTIA did provide “alternative EIRP, antenna height, and antenna down-tilt angle configurations” that it determined would limit base station signal strength to acceptable levels.¹¹⁷ LightSquared, however, rejected NTIA’s proposal because it “would render its network unable to

¹¹⁶ The use of a statistical signal propagation model and not a worst case model is inappropriate for the same reasons. LightSquared’s proposed statistical propagation models are used to guarantee minimum power levels required for robust communication over the entire coverage area and hence must, by design, be pessimistic, *i.e.*, overestimate path loss. When the transmissions risk interfering with continuous high precision navigation over the work site, farm or construction site, a spatially average power level that does not exceed a certain level does not provide sufficient protection. The interference level must not exceed the harmful level over the entire work site.

¹¹⁷ *NTIA Letter* at 4. LightSquared also continues to misrepresent the nature and operation of augmented, high-precision receivers. Augmented receivers do not employ “open” filters that inadvertently capture energy from the 1525-1559 MHz L-band. They are in fact mobile earth stations operating pursuant to Part 25 of the Commission’s Rules downlinking simplex satellite transmissions, including signals from Inmarsat in North America for the purpose of Deere’s StarFire network. These mobile earth stations enjoy interference protection rights under Part 25, and are operated pursuant to primary authority in the U.S. and International Table of Frequency Allocations.

deliver the necessary level of service absent a multi-billion dollar investment in additional base stations.”¹¹⁸

2. Government-Led Testing Never Evaluated Augmented, High Precision Receivers, and Never Concluded That Proposed Mitigation Solutions for This Class of Receiver Were Effective or Adequate

LightSquared’s Comments reassert that certain classes of receiver, including High Precision, can be retrofitted with low cost filters that will enable compatibility with a “Low 10 MHz” signal.¹¹⁹ LightSquared continues to grossly misrepresent and overstate the use of off-the-shelf filters as an interference mitigation solution, and continues to ignore the many design and performance challenges that have yet to be overcome regarding such filters. Deere’s own analysis of commercially available filter architectures demonstrates the many technical challenges and why current generation filters are unworkable as a LightSquared interference mitigation solution.¹²⁰

VI. LIGHTSQUARED’S CONTRACTUAL AND CONSTITUTIONAL ARGUMENTS HAVE NO MERIT

In a last-ditch effort to dissuade the Commission from prudently regulating use of the spectrum to protect the public interest, LightSquared attempts to convert basic issues of administrative law into contractual and constitutional claims. These claims simply have no merit. LightSquared misrepresents the nature of the Commission’s orders, in particular the series of orders granting MSS operators limited authority to provide integrated satellite/terrestrial services; granting Harbinger the authority to obtain SkyTerra’s licenses; and finally the *Conditional Waiver Order*, which specifically conditioned relief from the ATC integration requirements on

¹¹⁸ *NTIA Letter* at 5.

¹¹⁹ *See, e.g., LightSquared Comments* at 30.

¹²⁰ *See infra Exhibit 2 – Filter Solutions* (highlighting the technical and logistical challenges associated with the design of a filter hardened to high powered signals in the mobile satellite L-band).

satisfying interference issues with regard to GPS users. Nowhere in these orders is there evidence of a contract between the Commission and LightSquared. Nor is there a basis for any of the constitutional arguments LightSquared attempts to raise.

A. In Exercising Its Regulatory Authority, the Commission Did Not “Contract” with LightSquared and Therefore is Not Liable to LightSquared for “Breach”

LightSquared rests its contractual argument on a comparison between its circumstances and those faced by savings and loan institutions (S&Ls) at issue in the Supreme Court’s case *United States v. Winstar Corp.*,¹²¹ cited in LightSquared’s comments.¹²² Regardless of the meaning of that precedent, it has no application here. LightSquared can neither show that it entered into a contract with the Commission nor that the action proposed in the Public Notice – vacating the conditional waiver and suspending LightSquared’s ATC authority – would breach any binding contract between LightSquared and the Commission.

1. There is No Evidence that LightSquared and the Commission Entered into a Contract

LightSquared argues that it entered into a contract with the Commission to build a 4G LTE mobile network “in exchange for helping the Commission achieve important public policy objectives.”¹²³ LightSquared does not contend that the Commission entered into an express contract with LightSquared.¹²⁴ Instead, LightSquared claims a contract that is implied in fact.

¹²¹ 518 U.S. 839 (1996).

¹²² *LightSquared Comments* at 109.

¹²³ *Id.* at 111.

¹²⁴ This already marks a significant departure from the facts of the *Winstar* cases that worked their way through the US Court of Claims and Federal Circuit before reaching the Supreme Court in *Winstar*. In several of those cases, the government agencies with regulatory power over the savings and loan industry had entered into express agreements with the plaintiffs and did not dispute the existence of a contract. See *Statesman Savings Holding Corp. v. United States*, 26 Ct.Cl. 904, 908 (Cl. Ct. 1992) (describing that the agreement between the savings and loan and the government was “memorialized in an Assistance Agreement” and that agreement contained an “integration clause”).

While LightSquared refers to “conduct, oral communications, and writings” that support an implied contract, the only document offered by LightSquared in support of this purported contract is the Commission’s approval of the acquisition of Skyterra by Harbinger¹²⁵ that resulted in the formation of LightSquared.¹²⁶ This argument ignores the *Conditional Waiver Order*, which explicitly conditioned modification of the Commission licenses transferred in the *Harbinger Transfer Order* until “the Commission, after consultation with NTIA, concludes that the harmful interference concerns have been resolved and sends a letter to LightSquared stating that the process is complete.”¹²⁷ If LightSquared had genuinely believed the *Harbinger Transfer Order* was a contract between LightSquared and the Commission, surely it would have protested the conditional waiver as a breach of that compact.¹²⁸ LightSquared’s acquiescence in the *Conditional Waiver Order* undercuts its novel claim that the *Harbinger Transfer Order* is a contract.

Further, to demonstrate the existence of an implied in fact contract, LightSquared would have to show that the Commission received consideration.¹²⁹ LightSquared’s only articulated argument is that LightSquared’s proposed network build-out constitutes consideration because it would “directly advanc[e] the goals outlined in the National Broadband Plan.”¹³⁰ However, the

¹²⁵ *LightSquared Comments* at 111-112; *id.* at n. 283, n. 285.

¹²⁶ Unlike the savings and loan cases, there is no correspondence exchanged between the parties regarding an exchange of mutual promises that would evidence the bargaining that ordinarily precedes a contract. The Commission issued documents – all of which were publicly released, consisting of the order approving the license transfer, correspondence between the FCC and the applicants containing staff questions relating to foreign ownership issues, a notice to the public that the applications are pending and inviting comment, and a protective order to govern the submission of confidential information. None of those documents evidence the mutual assent or exchange of promises that comprise a contract.

¹²⁷ *Conditional Waiver Order* ¶ 44.

¹²⁸ Alternatively, if there were a contract, the *Conditional Waiver Order* implies that the contract was subject to a condition precedent, which has not been satisfied, therefore rendering the rest of the contract unenforceable. *Id.* ¶ 48.

¹²⁹ *Somali Dev. Bank v. United States*, 508 F.2d 817, 822 (Ct. Cl. 1974).

¹³⁰ *LightSquared Comments* at 112.

public interest benefits of an agency’s particular regulatory decision cannot properly be treated as contractual consideration. Otherwise, the regulatory acts of every agency in the government charged with making decisions on behalf of the public interest could be treated as contractual consideration, subjecting every exercise of the government’s regulatory power to garden variety contract claims. This interpretation would open up the floodgates of litigation, as every party aggrieved by the results of any agency’s regulatory decisions could bring their grievances as contract claims, tying up the government in court for decades.

LightSquared’s position on consideration is at odds with the precedents on which it relies – namely *Winstar* and related cases involving the S&L crisis. In those cases, the government was faced with enormous financial liabilities if it had to take over the failed thrifts.¹³¹ To reduce these liabilities, the government encouraged thrifts that appeared to be healthy to acquire the failed thrifts.¹³² While this resulted in a public benefit – the government had an interest in keeping thrifts viable instead of allowing them to fail¹³³ – it also resulted in a direct financial benefit to the government.¹³⁴ There is no similar consideration in this case. The government does not stand to benefit financially if LightSquared enters the market and adopts the business plan it advocated to the Commission during the consideration of the Harbinger transfer application.¹³⁵ Consideration is an essential component of an implied in fact contract, and is plainly missing here.

¹³¹ See *Winstar*, 518 U.S. at 846 (A “multitude of already-failed saving and loans confronted [the government] with deposit insurance liabilities that threatened to exhaust its insurance fund.”).

¹³² *Id.* at 847 ([B]ecause the regulators “lacked the funds to liquidate all of the failing thrifts” the government “chose to avoid the insurance liability by encouraging healthy thrifts . . . to take over ailing institutions.”).

¹³³ See *id.* at 846-48.

¹³⁴ See *id.* at 518 U.S. at 846-48 (“[C]ash contributions” from the government were often part of a transaction to rescue a failing S&L.).

¹³⁵ See *In the Matter of SkyTerra Communications, Inc., Transferor and Harbinger Capital Partners Funds, Transferee, Applications for Consent to Transfer of Control of SkyTerra Subsidiary, LLC*, 25 FCC Rcd 3059 ¶ 74 (rel. Mar. 26, 2010) (finding approval of license transfer to be “in the public interest” and

2. LightSquared Never Made an Offer to Contract

In trying to mold the facts to fit its contractual theory, LightSquared argues that its commitment to build the terrestrial component of its network using the ATC authority obtained in the *Harbinger Transfer Order* was an offer to contract with the Commission. This is revisionist history. In that proceeding, the then-applicants sought Commission approval of the acquisition by Harbinger of a controlling interest in SkyTerra and Immarsat.¹³⁶ At the time of the application, SkyTerra and Immarsat both held licenses to operate and provide satellite services. The application never indicated the parties were seeking to enter into a contract – or any type of agreement with the Commission.¹³⁷ What the applicants sought and received was simply regulatory approval to transfer licenses controlled by SkyTerra to Harbinger.¹³⁸ The Commission’s “mere approval of a merger” where the Commission is “acting solely in its regulatory capacity, d[oes] not create contractual obligations.”¹³⁹

noting lack of evidence that license transfer would harm competition). Of course, if the government had been interested in obtaining consideration from LightSquared, it could have considered reallocation of and auctioning the spectrum to the highest bidder, thereby placing LightSquared on an equal footing with other CMRS providers that had to obtain spectrum through public auctions. (“*Harbinger Transfer Order*”).

¹³⁶ See generally *SkyTerra Communications, Inc, Transferor, and Harbinger Capital Partners Funds, Transferee, Applications for Authority to Transfer Control of SkyTerra Subsidiary LLC*, IB Docket No. 08-184 (filed Aug. 22, 2008).

¹³⁷ See generally, *id.*

¹³⁸ See *Harbinger Transfer Order*, ¶¶ 74-77 (granting consent to applications for authority to transfer control of licenses from SkyTerra to Harbinger because license transfer was in the public interest; there was no evidence of harm to competition and the transfer did not violate any Commission rule or policy).

¹³⁹ *Fifth Third Bank of Western Ohio v. United States*, 402 F.3d 1221, 1234 (2005) citing *Anderson v. U.S.*, 344 F.3d 1343, 1355-56 (Fed. Cir. 2003). As the Federal Circuit has explained, not all of the S&L takeovers during the S&L crisis approved by government regulators involved contracts between the government and the healthy thrifts taking over the failed thrifts.

In some of the cases before this court, plaintiffs have argued that the [Federal Home Loan Bank Board]’s mere approval of a transaction demonstrated intent to contract regarding supervisory goodwill, even though there was specific evidence supporting the Government’s claim that it did not intend to agree contractually to special goodwill treatment.

This stands in stark contrast to the facts in *Winstar* and related S&L cases where the government actively sought out healthy thrifts to take over troubled ones.¹⁴⁰ This fact was critical to the court’s determination that the government had entered into implied contracts with the healthy thrifts. As the Federal Circuit explained:

These cases reflect the relationships formed between the FHLBB and the thrifts as the FHLBB sought help from these institutions to solve the national savings and loan crisis. The cases are not identical, yet all arose in the same regulatory and economic environment, a backdrop against which these cases can be viewed.¹⁴¹

Moreover, the Federal Circuit acknowledged that in many of the S&L cases, the government officers involved believed they were entering into contracts that guaranteed the use of particular accounting method.¹⁴²

3. **The *Harbinger Transfer Order* Cannot Lawfully be Construed as a Contractual Document**

Finally, the International Bureau does not have the regulatory power to bind the Commission into a contractual relationship through the ordinary exercise of regulatory decision-making. The Commission’s rules are clear that when a Bureau acts pursuant to delegated authority, as when the International Bureau adopted the *Harbinger Transfer Order*, they are not authorized to act on a request that “present[s] new or novel questions of law or policy which cannot be resolved under outstanding Commission precedents and guidelines.”¹⁴³ Because the Commission has never entered into a contract with a licensee through the process of granting an application

Fifth Third Bank, 402 F.3d at 1234 citing *Anderson*, 344 F.3d at 1355.

¹⁴⁰ See, e.g., *id.* at 1225 (2005) (“In each of the . . . transactions, FHLB-Cincinnati contacted Citizens to propose a supervisory merger with the failing thrift.”).

¹⁴¹ *Id.* at 1230.

¹⁴² See, e.g., *id.* at 1228 (The government officials “all thought that FHLBB had entered into contracts and that FHLBB had made a commitment . . . that could not be withdrawn.”).

¹⁴³ 47 C.F.R. §§ 0.241, 0.261 & 0.331.

for a license transfer, if the International Bureau had “accepted” an offer to contract through a grant of such an application – as LightSquared claims – it would have been acting outside the scope of its delegated authority.

4. Even if (Hypothetically) There Were Such a Contract, the Only Legal Remedy Available to LightSquared Would Be Money Damages, Not an Order Reinstating its MSS/ATC Authorization

Even assuming a contract exists between LightSquared and the Commission, LightSquared’s remedy for a breach of that contract cannot be found in a Commission proceeding. Even in *Winstar*, the court did not bar the new government regulation – the regulation that breached the government’s contracts with the S&Ls – from taking effect.¹⁴⁴ Instead, the regulation took effect and the government was liable for damages. But in order for LightSquared to obtain such a result, it would have to initiate litigation with the Commission in the Court of Claims, prove the existence of a contract and prove damages. While the *Winstar* plaintiffs were able to prevail on the existence of a contract, many of the resulting damages claims resulted in less recovery – if any – than originally anticipated.¹⁴⁵

¹⁴⁴ See *Winstar*, 518 U.S. at 868 (nothing in the contracts purported “to bar the Government from changing the way in which it regulated the thrift industry.”). Ordinarily, a regulatory act of the Commission (or the Bureau under delegated authority) would constitute a sovereign act, the exercise of which can not give rise to governmental liability. See *United States v. Central Eureka Mining Co.*, 357 U.S. 155 (1958); *Glasgow Associates v. United States*, 495 F.2d 765 (Cl. Ct. 1974). It is well-established that the United States has not waived “sovereign immunity for claims that arise out of a contract and that seek specific performance of the contract as relief.” *Robbins v. U.S. Bureau of Land Management*, 438 F.3d 1074, 1082 (10th Cir. 2006); see also *Up State Fed. Credit Union v. Walker*, 198 F.3d 372, 375 (2d Cir. 1999); *Tucson Airport Auth. v. Gen. Dynamics Corp.*, 136 F.3d 641, 646 (9th Cir. 1998); *Transohio Sav. Bank v. Dir., Office of Thrift Supervision*, 967 F.2d 598, 610 (D.C. Cir. 1992); *Coggeshall Dev. Corp. v. Diamond*, 884 F.2d 1, 3 (1st Cir. 1989); see also *Bowen v. Massachusetts*, 487 U.S. 879, 921 (1988) (Scalia, J., dissenting) (“It is settled that sovereign immunity bars a suit against the United States for specific performance of a contract, and that this bar was not disturbed by the 1976 amendment to § 702 [of the Administrative Procedures Act].” (internal citation omitted)).

¹⁴⁵ Roger D. Citron, *Lessons from the Damages Decisions Following United States v. Winstar Corp.*, 32 Pub. Cont. L.J. 1 (2002).

B. LightSquared Has No Property Right in its MSS/ATC Authorization and Therefore Cannot Complain that the Commission’s Proposed Action is a Violation of the Takings Clause of the Fifth Amendment

LightSquared claims that the actions proposed in the public notice — vacating the conditional waiver and suspending LightSquared’s ATC authority — amount to a regulatory taking that could result in the government being financially liable to LightSquared. This argument is not persuasive. While LightSquared relies on *Penn Central Transportation Co. v. New York City*,¹⁴⁶ it fails to acknowledge that the Court rejected the takings claim in that case.¹⁴⁷ Its argument is further diminished because LightSquared cannot show that it has a “property interest” subject to the Fifth Amendment takings analysis. And even if it has such a property interest, it exaggerates the economic impact on its business by conveniently omitting any discussion of the satellite authorizations it will continue to retain. Finally, even if there were a property interest, the proposed action cannot be construed as a “regulatory taking” under applicable law.

LightSquared’s takings argument simply assumes that the issuance of a license to use a portion of the radio spectrum confers a property interest giving it standing to make a claim under the Fifth Amendment. This assumption is incorrect. It is well-settled that “radio (or electromagnetic) spectrum belongs to no one. It is not property that the federal government can buy or sell.”¹⁴⁸ In order to regulate the use of radio spectrum the Commission, pursuant to the Communications Act, “licens[es] . . . blocks of spectrum for the ‘public interest, convenience, or necessity.’”¹⁴⁹ Thus, “[a] license does not convey a property right; it merely permits the licensee to use

¹⁴⁶ 438 U.S. 104 (1978).

¹⁴⁷ *Id.* at 121-22.

¹⁴⁸ *In re Nextwave Personal Communications, Inc.*, 200 F.3d 43, 50 (2d Cir. 1999).

¹⁴⁹ *Id.* at 50-51 (citing 47 U.S.C. § 307(a)).

the portion of the spectrum covered by the license in accordance with its terms.”¹⁵⁰ In other words, “no person is to have anything in the nature of a property right as a result of the granting of a license.”¹⁵¹

This is the only possible interpretation of the Act. The language of Section 301 is unambiguous: it establishes the purpose of the Act, which is

to provide for the use of [channels of radio transmission], *but not the ownership thereof*, by persons for limited periods of time, under licenses granted by Federal authority, and no such license shall be construed to create any right, beyond the terms, conditions, and periods of the license.¹⁵²

Even when the Commission issues some licenses for spectrum use pursuant to an auction, it does not convey a property right.¹⁵³ The purpose of the auctions is not “to sell off the spectrum”¹⁵⁴ but to “ensure that spectrum is used more productively and efficiently than if handed out for free.”¹⁵⁵ Thus, even where a license is issued pursuant to an auction,¹⁵⁶ it “is not to ‘be construed to create any right, beyond the terms, conditions, and periods of the license.’”¹⁵⁷ In any case, neither LightSquared nor its predecessors obtained any license rights by auction, so the relevance of this argument is a mystery at best.

In addition, even if LightSquared did have a property right at issue, its claim still fails because the Bureau’s proposed action would not be a taking. LightSquared’s argument focuses

¹⁵⁰ *Id.* at 51.

¹⁵¹ *FCC v. Sanders Bros. Radio Station*, 309 U.S. 470, 475 (1940).

¹⁵² 47 U.S.C. § 301 (emphasis supplied).

¹⁵³ *In re Nextwave*, 200 F.3d at 53.

¹⁵⁴ *Id.* at 52.

¹⁵⁵ *Id.*

¹⁵⁶ *LightSquared Comments* at 114.

¹⁵⁷ *Id.* at 53 *citing* 47 U.S.C. § 301.

exclusively on the ATC component of its MSS license.¹⁵⁸ This ignores two critical issues. First, LightSquared’s ATC authorization was always ancillary to its satellite license and required compliance with the Commission’s integration gating criteria. Second, LightSquared ignores the significant value it has in the satellite component of its MSS/ATC license, which given the “ancillary” nature of the terrestrial authorization must be considered its “primary expectation” concerning its use of its licensed spectrum.

LightSquared’s viable satellite authorization precludes the assertion that the proposed actions would be a *per se* taking of property.¹⁵⁹ Supreme Court precedent is clear that a *per se* taking only “applies to regulations that completely deprive an owner of ‘all economically beneficial us[e]’ of her property.”¹⁶⁰ Because LightSquared retains its license to use its satellite authorization and because the Public Notice proposes only to partially suspend its ATC authority “to an extent consistent with the NTIA Letter,”¹⁶¹ LightSquared could not be the subject of a “total regulatory taking[.]”¹⁶²

In the absence of a *per se* taking, LightSquared’s takings claim would be governed by the standard set forth in *Penn Central*.¹⁶³ That standard focuses on the “character of the government action,”¹⁶⁴ but also on “the nature and extent of the interference with rights in the parcel as a whole.”¹⁶⁵ LightSquared, however, does not discuss the latter prong of the *Penn Central* stan-

¹⁵⁸ *LightSquared Comments* at 114-115.

¹⁵⁹ *Id.* at 114.

¹⁶⁰ *Lingle v. Chevron U.S.A.*, 544 U.S. 528, 538 (2005), *citing Lucas v. South Carolina Coastal Council*, 508 U.S. 1003, 1019 (1992) (emphasis in *Lucas*).

¹⁶¹ *Feb. 15th Public Notice* at 4.

¹⁶² *See Lingle*, 544 U.S. at 538 *citing Lucas*, 505 U.S. at 1026.

¹⁶³ 438 U.S. 104 (1978).

¹⁶⁴ *LightSquared Comments* at 114.

¹⁶⁵ *Penn Central*, 438 U.S. at 130-131.

dard, under which the Court “does not divide a single parcel into discrete segments and attempt to determine whether rights in a particular segment have been entirely abrogated.”¹⁶⁶

Applying this standard in *Penn Central*, the Court found that the government action at issue in that case (designation of Grand Central Terminal in Manhattan as an historic landmark and prohibition of construction on top of the building) “permits the property owner to use the property precisely as it has been used – as a railroad terminal containing office space and concessions.” The same can be said of the Bureau’s proposed actions here. The primary use of LightSquared’s license has been for the provision of satellite services and its license to use spectrum to provide those services will remain unaltered by the proposed *vacatur* of the conditional waiver and suspension of ATC authority. Even after those actions, LightSquared will be able to use its spectrum “precisely as it has been used” – to provide satellite service.

C. Neither the Vacatur of the Conditional Waiver Order Nor the Partial Suspension of LightSquared’s ATC Authority Violates the Due Process, Equal Protection or Bill of Attainder Provisions of the Constitution

LightSquared further attempts to dress up its bread and butter administrative law claims as constitutional claims. As these reply comments have addressed, none of LightSquared’s administrative law claims has merit. The Commission has ample authority to alter the terms of the licenses it issues to use radio spectrum, especially when faced with the harmful interference confirmed in the NTIA Report. LightSquared’s constitutional arguments thus fail for the same reasons its administrative law arguments fail.

1. There is No Due Process Violation of LightSquared’s Rights

Despite LightSquared’s claims to the contrary, there can be no “arbitrary government deprivation of property” without due process¹⁶⁷ because, as explained in section VI.B, Light-

¹⁶⁶ *Penn Central*, 438 U.S. at 130.

Squared’s interest in the radio spectrum cannot lawfully be characterized as property. And even if there were a property interest, the analysis of a due process claim turns on whether LightSquared received “fair notice” before the agency’s action against its license.¹⁶⁸ The inquiry focuses on whether “by reviewing the regulations and other public statements issued by the agency, a regulated party acting in good faith, would be able to identify, with ascertainable certainty, the standards with which the agency expects parties to conform.”¹⁶⁹

There can be little doubt that should it vacate the *Conditional Waiver Order* or suspend LightSquared’s ATC authority, the Bureau’s public statements have provided sufficiently fair notice to LightSquared. The *Conditional Waiver Order* spelled out the specific steps that would need to occur in order to satisfy the Commission regarding interference concerns.¹⁷⁰ The order likewise identified the process by which LightSquared would work with the GPS community to test for interference, and LightSquared was involved in every aspect of the process. In addition, the Bureau sought comment on the report of the technical working group involving the GPS community and LightSquared.¹⁷¹ The Bureau has now opened another round of comment to evaluate its options with respect to LightSquared’s ATC authority and the conditional waiver.¹⁷² It has also indicated that if it decides to take those steps, “its order of modification would not

¹⁶⁷ *LightSquared Comments* at 117.

¹⁶⁸ See *Trinity Broadcasting of Florida v. FCC*, 211 F.3d 618, 628 (D.C. Cir. 2000).

¹⁶⁹ *Trinity Broadcasting*, 211 F.3d at 628, quoting *General Electric Co. v. EPA*, 53 F.3d 1324, 1328-29 (D.C. Cir. 1995).

¹⁷⁰ *Conditional Waiver Order*, ¶ 44.

¹⁷¹ *Comment Deadlines Established Regarding the LightSquared Technical Working Group Report*, Public Notice, IB Docket No. 11-109, DA 11-1133 (Int’l Bur., rel. June 30, 2011).

¹⁷² See *Feb. 15th Public Notice*.

become final until after LightSquared has been given an additional period of time to protest, pursuant to the requirements of Section 316(a).”¹⁷³

LightSquared has been given numerous opportunities to convince the Commission to allow it to operate the terrestrial component of its integrated network and resolve legitimate concerns regarding harmful interference. The Bureau’s statements since the *Conditional Waiver Order* have provided LightSquared with ample notice about the consequences if testing could not resolve the concerns regarding interference with GPS. As confirmed by the NTIA report, those concerns have not been resolved. The Bureau’s process is thus consistent with its obligations under the APA and LightSquared’s due process rights under the Constitution.

2. LightSquared Does Not Have a Valid Claim that the Commission’s Proposed Actions Amount to a Bill of Attainder

Article I, Section 9, clause 3 of the Constitution provides that no “Bill of Attainder or *ex post facto* law shall be passed [by Congress].”¹⁷⁴ This clause prohibits punishment of a specific person or persons without trial.¹⁷⁵ It is designed to protect individuals against statutes passed by Congress that have punitive effect.

But the Bureau’s proposed actions affecting LightSquared’s ATC authorization plainly are not punitive in nature, and would not be a “bill of attainder” under applicable Supreme Court precedent. In order to be an unconstitutional bill of attainder, an action must “legislatively

¹⁷³ See *Feb. 15th Public Notice* at 4 n. 20.

¹⁷⁴ It is unclear whether a licensing decision by the Commission falls within the ambit of a “law” subject to the bill of attainder clause at all. Most of the circuit courts of appeal have held that certain regulations, such as parole regulations, are not “laws” for purposes of the Constitution’s prohibition against “*ex post facto*” laws, which is found in the same clause of the Constitution. See *Bailey v. Gardebring*, 940 F.2d 1150, 1156-1157 (8th Cir. 1991) (citing to majority of circuit courts of appeal that agree that parole regulations are not laws within the prohibition against *ex post facto* laws).

¹⁷⁵ See *Selective Service System v. Minnesota PIRG*, 468 U.S. 841, 847 (1984).

determine[] guilt and inflict punishment upon an identified individual.”¹⁷⁶ In evaluating where the law inflicts such “forbidden punishment,” the Supreme Court considers “(1) whether the challenged statute falls within the historical meaning of legislative punishment;” (2) whether the statute “further[s] nonpunitive legislative purposes; and (3) whether the “record evinces a congressional intent to punish.”¹⁷⁷

The proposed *vacatur* of the *Conditional Waiver Order* does not meet any of these standards. The *Conditional Waiver* explicitly established that LightSquared’s proposed conversion of its satellite spectrum for terrestrial services would be premised on a demonstration of non-interference to GPS. “As a condition of granting this waiver, the process . . . addressing the interference concerns regarding GPS must be completed to the Commission’s satisfaction before LightSquared commences offering commercial service pursuant to this waiver on its L-band MSS frequencies.”¹⁷⁸ LightSquared accepted this condition to the ATC authority modification order.¹⁷⁹ It cannot now, after accepting this condition, claim that adherence to the condition inflicts punishment.

The Bureau’s proposed actions also would not constitute punishment because they “do not impose a perpetual bar” to using Commission-issued spectrum licenses to provide service. As already noted, LightSquared will continue to have a viable satellite authorization allowing the company to offer satellite service. Similarly, its ATC authorization will be suspended, not

¹⁷⁶ *Nixon v. Administrator of General Services*, 433 U.S. 425, 468 (1977).

¹⁷⁷ *Selective Service*, 468 U.S. at 852 (citations omitted).

¹⁷⁸ *Conditional Waiver Order* ¶ 41.

¹⁷⁹ “[I]n order to address the concerns raised, LightSquared states that it would accept, as a condition of the grant of its request, the creation of a process to address interference concerns regarding GPS and, further, that this process must be completed to the Commission’s satisfaction before LightSquared commences offering commercial service, pursuant to the approval of its request, on its L-Band MSS frequencies.” *Conditional Waiver Order* ¶ 40 (citing Letter from Sanjiv Ahuja, Chairman and CEO of LightSquared, to Marlene H. Dortch, Secretary, Federal Communications Commission, SAT-MOD-20101118-00239, at 1 (filed Jan. 21, 2011)).

revoked.¹⁸⁰ A legislative act that “leaves open perpetually the possibility of [overcoming a legislative restriction] does not fall within the historical meaning of forbidden legislative punishment.”¹⁸¹ And even if the analysis focused only on the proposed suspension of ATC authority, that action is not perpetual either. The Commission had not indicated that that LightSquared and/or other providers may never expand terrestrial service in the L-Band.

In addition, the proposed licensing decisions regarding LightSquared’s ATC authority “serve a non-punitive purpose” – namely protecting the public interest, convenience and necessity by denying a license for the use of terrestrial base stations that will demonstrably interfere with GPS systems that are critical to a broad cross-section of the American economy. This is a regulatory judgment and not an “impermissible ‘judgment censuring or condemning any man or group of men’ for their personal conduct.”¹⁸²

Finally, the record lacks the “‘smoking gun’ evidence of punitive intent necessary to establish a bill of attainder.”¹⁸³ The presence of “unmistakable evidence of punitive intent . . . is required before a congressional enactment . . . may be struck down.”¹⁸⁴ No such evidence exists here. The Commission’s intent was to protect important uses of GPS from demonstrable harmful interference. That is regulation, not punishment, and LightSquared’s bill of attainder argument is thus untenable.

¹⁸⁰ See *Feb. 15th Public Notice* at 4.

¹⁸¹ *Selective Service*, 468 U.S. at 853.

¹⁸² *SBC Communications v. FCC*, 154 F.3d 226, 243 (5th Cir. 1998) citing *U.S. v. Brown*, 381 U.S. 437, 453-54 (1965).

¹⁸³ *SBC Comm.*, 154 F.3d at 243.

¹⁸⁴ *Id.* quoting *Selective Service*, 468 U.S. at 856 n.15 (internal citations omitted).

3. LightSquared Has No Equal Protection Claim

The Equal Protection Clause of the Constitution “requires the government [to] treat similarly situated persons in a similar manner.”¹⁸⁵ Unless the claim of discrimination involves a “suspect classification” such as those based on race, the law is subject to a rational basis review rather than heightened scrutiny.¹⁸⁶ Under rational basis review, the government’s action is presumed constitutional and the burden is on the challenger to negate all the potential bases for the action at issue. A reviewing court must accept the government’s generalized rationale, even where the fit between the purpose and the means is less than ideal.¹⁸⁷

Contrary to LightSquared’s argument, not all government action affecting a single person amounts to an equal protection violation. The Supreme Court has acknowledged that

There are some forms of state action, however, which by their nature involve discretionary decision-making based on a vast array of subjective, individualized assessments. In such cases, the rule that people should be “treated alike, under like circumstances and conditions” is not violated when one person is treated differently from others.¹⁸⁸

The Commission has a rational basis for vacating LightSquared’s conditional waiver and suspending its ATC authority. Both actions are necessary to guard against harmful interference with GPS operations.¹⁸⁹ Those GPS operations are important to the public, and as such, protecting them from harmful interference is consistent with the public interest, convenience and necessity and the statutory command Congress required the Commission to apply in radio spectrum

¹⁸⁵ *Gary v. City of Warner Robins*, 311 F.3d 1334, 1337 (11th Cir. 2002).

¹⁸⁶ *Eide v. Sarasota County*, 908 F.2d 716, 722 (11th Cir. 1990).

¹⁸⁷ *Leib v. Hillsborough County Public Transp. Com’n*, 558 F.3d 1301, 1306 (11th Cir. 2009).

¹⁸⁸ *Engquist v. Oregon Dep’t of Agriculture*, 553 U.S. 591, 603 (2008).

¹⁸⁹ *See NTIA Letter*, at 1.

licensing decisions. Thus, the equal protection clause is not implicated in the Commission's proposed actions.

CONCLUSION

For the reasons set forth above, Deere reaffirms its support for the Commission's proposed vacatur of the Conditional Waiver and indefinite suspension of LightSquared's ATC authority.

Respectfully submitted,

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Exhibit 1 – Noise Floor Degradation Due to OOB

Out-of-Band Emission Noise Floor Degradation

There is significant concern over the potential for the aggregate OOB levels from multiple LightSquared handsets to significantly degrade the noise floor and hence performance of a GNSS receiver. The current requirement sets OOB at -90 dBW/MHz and after five years decreases OOB for newly manufactured devices to -95 dBW/MHz. [Table 1](#) shows that a single LightSquared handset would degrade the noise floor of a GNSS receiver if it were 1 meter away with an OOB of -90 dBW/MHz by 16 dB.¹

Table 1. Noise Floor Degradation with One Handset 1 Meter Separation

1	OOBE Specification	-60	dBm/MHz
2	OOBE power density	-120	dBm/Hz
3	OOBE power density / handset @ 1 meter	-156.5	dBm/Hz
4	Thermal Noise power density	-174	dBm/Hz
5	Noise Figure (example)	1.5	dB
6	Equivalent Thermal Noise power density	-172.5	dBm/Hz
7	Total power density (3 + 6)	-156.4	dBm/Hz
8	Noise Floor Degradation (6 – 7)	16.1	dB

Alternatively, with 10 handsets within 10 meters of a GNSS receiver, the GNSS noise floor would be degraded by at least 7 dB as shown in [Table 2](#). In a large scale deployment, such as that proposed by LightSquared, this latter scenario is easily envisioned well before the OOB limit is decreased to -95dBw/MHz.

Table 2. Noise Floor Degradation 10 Handset within 10 Meters

1	OOBE Specification	-60	dBm/MHz
2	OOBE power density	-120	dBm/Hz
3	OOBE power density / handset @ 10 meters	-176.5	dBm/Hz
4	10 handsets	10	dB
5	Total OOB power density @ 10 meters (3+4)	-166.5	dBm/Hz
6	Thermal Noise power density	-174	dBm/Hz
7	Noise Figure (example)	1.5	dB
8	Equivalent Thermal Noise power density	-172.5	dBm/Hz
9	Total power density (5 + 8)	-165.6	dBm/Hz
10	Noise Floor Degradation (8 – 9)	7	dB

The above analysis and prior discussions regarding LightSquared handset emissions demonstrate that LightSquared's predecessors did not envision the large scale

¹ Simultaneous operation of a LightSquared handset and GPS receiver within one (1) meter of proximity would occur in routine scenarios (e.g., driving a car enabled with GPS navigation while a passenger operates a handset).

Exhibit 1 – Noise Floor Degradation Due to OOB

terrestrial broadband network that LightSquared now proposes to deploy. The 5 year transition between the -90 dBW/MHz and the -95 dBW/MHz OOB specification suggests that the anticipated uptake of the ATC service would be slow to develop and spatially sparse. Moreover, analysis associated with the 2002 commitment by LightSquared's predecessor, Mobile Satellite Ventures, to reduce OOB emissions to -95 dBW/MHz reflects degradation of approximately 2 dB in the noise floor of a GPS receiver at a range of 4.5 meters from a single handset but does not further evaluate aggregate OOB from multiple handsets.² Given that at 5 years post-deployment of ATC network infrastructure interference analysis evaluated OOB levels from a single handset at 4.5 meters, the interference envisioned when long-term OOB levels were established was from an occasional satellite handset operating at considerable distance from GPS receivers, not from a large scale terrestrial-only broadband network.³

² See Letter to FCC from Mobile Satellite Ventures L.P. and the U.S. GPS Industry Council, IB Docket No. 01-185, at 4-5 (July 17, 2002).

³ Operation of a handset at 4.5 meters from a GPS receiver is consistent with traditional MSS operations, which generally require the receiver to have clean line-of-sight to the overhead satellite. Traditional MSS handsets are less likely to be operated at sub 1-meter distances from many types of GPS devices. For example, an MSS handset will generally not work in an in-motion automobile due to the attenuation created by the vehicle's chassis, thus making it unlikely for a traditional MSS handset and Personal/General Navigation device to be operated in close proximity while a vehicle remains in-motion.

Filter Solutions

LightSquared wrongly asserts¹ that “Any High Precision Devices That May Be Incompatible Can Be Made Robust with Currently Available Preselector Filters” and that they have “...demonstrated the viability of filter solutions to provide compatibility without adversely affecting performance, cost, or size.” The viability of filter solutions to harden GNSS receivers against stronger signals in the mobile satellite L-band has not been proven, and is an extremely complex technical issue that will require extensive analysis and testing far beyond what has been undertaken in the current proceeding. Simplistic statements such as those above made by LightSquared and its affiliates are fundamentally incorrect and unhelpful to examining this difficult technical issue.

There are many classes of GNSS receiver with varied and unique architectures, applications, and requirements including, just to name a few:

- Augmented, high precision receivers that jointly receive mobile satellite and GNSS signals.
- Various wideband architectures, including the DOD and FAA next generation navigational receivers.
- Non-navigational timing receivers.
- A multitude of personal/general navigation receivers, including systems used to dispatch emergency first responders.
- Space-base receivers.

Different manufacturers utilize different, and in some circumstance, unique architectures. Some receivers have integrated antennas and filters, while others have remote antennas. Some receivers are concerned with all GNSS signals, others with just a subset of the available signals, while others require only one signal. Some receivers use signals on multiple frequencies, while others use only one GNSS frequency. The many variables that go into the design of the aforementioned receivers are complicated by LightSquared and the various proposals it has submitted to the FCC over the past year with alternative power and signal strength levels, which give rise to a large range of potential but as yet untested filter options, as illustrated in Figure 1 below. The classes of GNSS receivers are those defined by the Technical Working Group and frequently used thereafter in discussing the types of receivers affected by the LightSquared signals.

¹ Comments in Opposition of LightSquared Inc., IB Docket No. 11-109, filed March 16, 2012, at 85 (“LightSquared Comments”).

Exhibit 2 – Filter Solutions

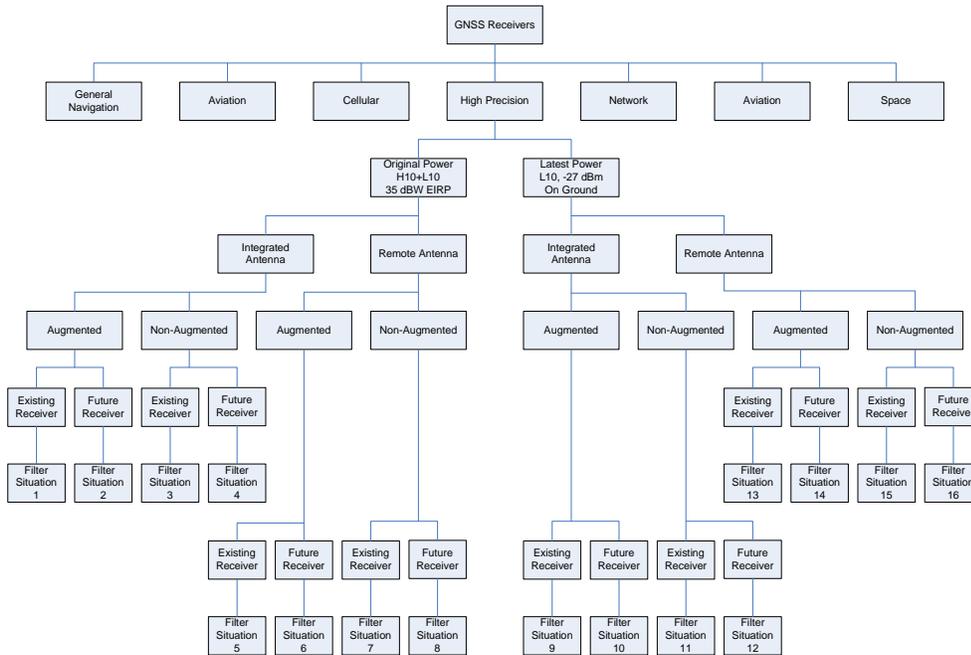


Figure 1 Filter Possibilities

Figure 1 shows some of the possibilities for hardened filter situations for only one of the seven types of GNSS receivers (High Precision). There are similar structures for the other six classes of receivers. In many of these situations, the filter designs would be different.

The paragraphs below examine the possibilities for the 16 filter situations shown in Figure 1 for High Precision receivers. These 16 filter situations represent a subset of the actual possibilities, as factors such as the GNSS frequencies to be used are ignored, and differences due to integral or remote antennas are not analyzed.

In filter situations 1, 3, 5, 7, 9, 11, 13, and 15, there is no solution compatible with the LightSquared environment. Existing receivers cannot tolerate the LightSquared power. The range at which they are affected and eventually disabled varies, depending on many factors, but there is no solution for these environments. To make filter situations 1, 3, 5, and 7 worse, the High 10 and Low 10 signals create third order intermodulation products that are in-band for GNSS receivers and cannot be filtered out. In addition, for filter situations 1, 2, 5, 6, 9, and 13, there is no frequency at which the augmentation signal can be received.

In filter situations 2, 4, 6, and 8, it is extremely unlikely that there is a solution compatible with the LightSquared environment. These are new

Exhibit 2 – Filter Solutions

designs, but there are multiple reasons why these filter situations are unworkable:

- The power they would be asked to accommodate, the minimal frequency separation from the GPS band, and the rolloff characteristics of the corresponding filtering would require extreme filtering that will distort measurements and result in degraded receiver performance.
- The High 10 and Low 10 signals create third order intermodulation products that are in-band for GNSS receivers and cannot be filtered out.
- This type of filtering would preclude the use of some GNSS signals, such as the Galileo PRS signal.
- The only way this LightSquared power environment could be accommodated would be to not use the full bandwidth of the GNSS signals, but to filter around signals in the middle of the GNSS band. This is not compatible with many of the modernized GNSS signals, which are wideband signals. Since wideband signals are a requirement for accuracy, this would result in a severe loss of accuracy.

Filter situations 12 and 16 are difficult cases. These are new receiver designs in a limited LightSquared power environment which do not use augmentation. In these cases, it may be possible to develop designs that are compatible with the LightSquared power and do not sacrifice performance, at least beyond some minimum distance from a LightSquared transmitter. However, this remains uncertain, despite pronouncements from LightSquared and Javad GNSS asserting that they have developed viable filters.²

- Performance –The stronger filtering required may have performance effects. Stronger filtering causes group delay distortions that may affect measurement quality and consequently receiver accuracy. With the spectral environment undefined, the level of filtering required remains uncertain.
- Cost – The filtering in each receiver is different, but generally, it will cost more to add stronger filtering. How much cost is increased depends on the level of filtering required and the architecture of the receiver.
- Size – It is difficult to generalize about size. In some cases, the receiver and/or antenna may remain unchanged in size. In other cases, size might need to change.

² See, e.g., Ex Parte Letter of Javad GNSS, IB Docket No. 11-109, filed Jan. 24, 2012, at 2-3.

Exhibit 2 – Filter Solutions

Filter situations 10 and 14 are even more difficult cases. These are new receiver designs in a limited LightSquared power environment which do use augmentation. The discussion above about filter situations 12 and 16 applies here with respect to the GNSS signals. The additional complexity in filter situations 10 and 14 concerns the frequencies at which the MSS L-band augmentation signals can be placed. Assuming that LightSquared filtered the Low 10 signal as they committed to do for the High 10 signal (OOBE at -100 dBW/MHz), there are two possibilities for the augmentation signals:

- Very close to GNSS (~1557 MHz – 1559 MHz) – placement here might allow the augmentation signal to be filtered in along with the GNSS signals, but there is no assurance that the signals can permanently be placed here. In addition, since placement at these frequencies is not compatible with usage elsewhere in the world, it could be necessary to have two different receivers, one for use in the US and one for use elsewhere, which would increase cost.
- Between 1540 MHz and 1555 MHz – this would require an additional RF band but might permit the augmentation signals to be used while excluding the LightSquared energy at Low 10. The presence of an additional RF section would increase cost and might increase size.

The paragraphs above are intended to illustrate the complexity of the filtering situation in GNSS receivers. Assertions that a simple filter exists that can readily be fitted to an arbitrary receiver are simply not correct. The design of the RF section of a GNSS receiver involves many factors and complex tradeoffs are made in receiver designs to fit a particular receiver for its intended application. The insertion loss of a filter at the front of the RF chain is particularly significant, as it directly affects the overall noise figure for the receiver, and therefore its sensitivity. Some of the filters suggested by LightSquared have insertion losses that make them unusable for high precision designs.

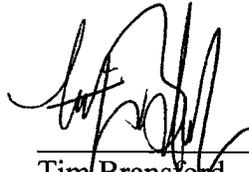
In summary:

- There is no single filter that suffices for all these high precision situations, much less all GNSS situations.
- It is not correct that filters suitable for all these high precision situations currently exist, much less all GNSS situations.
- Impartial testing sufficient to validate performance in all these situations has not been done, and it is not clear that there will not be performance effects due to the increased filtering.
- Many filter designs involve a dramatic increase in cost.

CERTIFICATE OF SERVICE

I, Tim Bransford, hereby certify that on March 30, 2012, I have caused a copy of Deere & Company's Reply Comments to be served via U.S. Mail on the following:

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